B 652797

PIPE LINE INDUSTRY

MAY 1957

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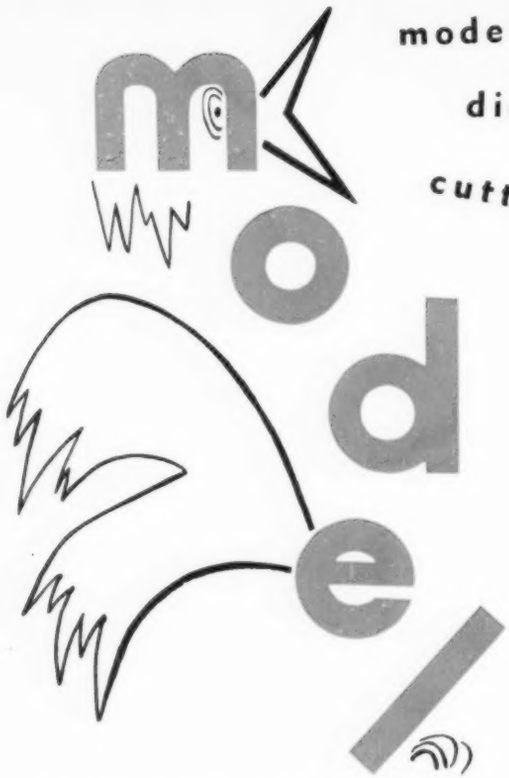
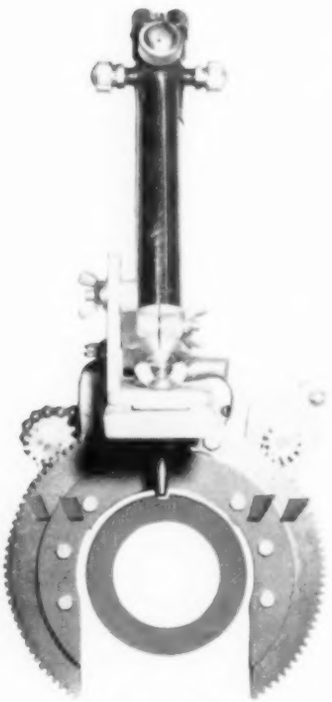


model "O" for small diameter pipe cutting and beveling



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Welding of small diameter pipe (1½" to 4") becomes the easiest, quickest, most accurate — **and most economical** — means of joining such pipe when every cut and bevel is square and accurate. The never-failing precision-action of H & M's exclusive Model "O" has been field-tested and proved on hundreds of welding jobs — **even** when operated **by apprentice welders!** A perfect cut and bevel can be made on 2" pipe, for instance, in less than 30 seconds actual cutting time — **by an inexperienced operator.**

The H & M Model "O" is built on the same split-gear horseshoe principle as the larger H & M Machines (for 4" to 36" pipe). Weighing only 7½ lbs., it may be placed on continuous pieces of pipe — moved from one pipe to another — changed from one size to another — **all in a matter of seconds!**

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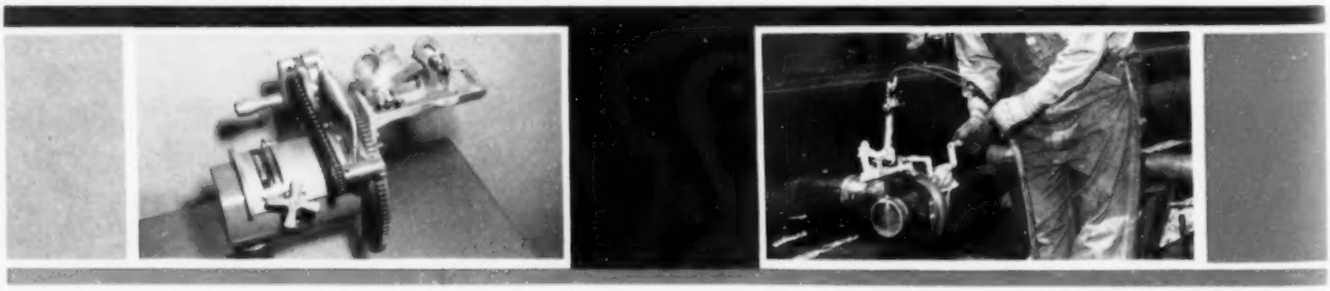
The Model "O" — like all H & M Machines — can easily and quickly be motorized for automatic operation.

Write today for illustrated bulletin.



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PIPE LINE INDUSTRY

CONTENTS and Quick Look

May, 1957 Vol. 6, No. 5

To help you put first things first, scan these time-saving digests, checking ☑ those you want to read first.

Three papers from Annual API Pipe Line Conference, Cleveland, May 6-8

Which Are More Economical—Loops or Boosters?

☐ Graphic comparisons show how automatic control affects selection of the least costly method of increasing system capacity. Here is a practical approach to the solution of these special design problems.

By Nicholas B. Mavris.....Page 36

Unattended Pipe Line Deliveries Work

☐ Standard Oil Company (Indiana) tests of unattended pipe line deliveries to a bulk plant show that the system is workable. Present economic analysis could lead to more installations. Successful results can set future trends.

By W. D. Lomax and H. W. Wilker.....Page 43

What You Can Expect From Today's PD Meters

☐ New higher capacity units promise accurate measurement in the 10,000 barrel-per-hour range. Interstate Oil Pipe Line Company reports on the first four years' service with PD meters. Here are performance curves showing accuracy and head loss data for various type meters handling both crude and products.

By D. C. McKinley.....Page 46

New Look in Human Relations

☐ The pipe line industry has everything to gain and nothing to lose by adopting modern research methods to improve employe efficiency and obtain more harmonious employe relations. Many companies have found their most effective research tools are "direct" research to find a common factor in comparable situations—and "background" research to get the facts. Here is an expert's views on oil industry progress in this vitally important field.

By E. L. K. Frost.....Page 54

Stay Alive Around Sour Crude

☐ Hydrogen sulfide, the poisonous gas in sour crude oils, is a killer. Remember its properties and know how to guard yourself against it. Learn, too, how you can act quickly to save a life.

By Anthony Gibbon.....Page 58

What Phillips Learned from Pipelining LPG

☐ After handling more than 17 million barrels of propane since 1947, Phillips Pipe Line Company gives the answers to some of the toughest obstacles a pipe line operator faces in shipping LPG. Mechanical seals, deration of pumps, careful buffering, special storage provisions and leak repair plans make LPG look like just another product.

By F. B. Neptune.....Page 60

New and More Valuable Rule-of-Thumb Notebook

This and future issues of PIPE LINE INDUSTRY will contain more detailed engineering data sheets in addition to time-saving Rules of Thumb. This expanded feature will include graphs, charts, data tables and nomograms selected to help you solve engineering design, construction and operating problems. For each acceptable illustrated one-page contribution, PIPE LINE INDUSTRY will pay $25. Send us your favorite. Rules of Thumb are still being accepted at regular payment of $15 each. This month's Rule of Thumb feature is on Page 57.

Air Agitation Controls Crude Tank Fires

☐ This new tool for fighting crude oil tank fires can handle a lot of tough situations. Used properly, it will extinguish high flashpoint crude fires before the heat wave becomes too deep. With conventional fire fighting techniques, it cools down the burning surface, makes control easier and reduces the chances of slopover.

By J. L. Risinger.....Page 65

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PIPE LINE INDUSTRY published every month. Entered as second class mail matter July 9, 1954, at the post office at Houston, Texas, under the act of March 3, 1879.

Oil Cannot Rely on Suez

Reopening of the Suez Canal does not end the Mid-East crisis. Actually the basic problem is no nearer a solution today than when Nasser seized the canal last July.

Ahead are months and months of wrangling in an effort to reach a satisfactory compromise agreement on the canal's future operations. But it is extremely doubtful if it will be possible to reach a fully satisfactory solution. How can there be a definite guarantee that the Suez will never be closed again? Until Nasser's sudden unexpected seizure, the world thought Suez would never be closed. Regardless of any agreement this could happen again.

•

Western Nations must not be lulled into a false feeling of security because shipping again is moving through the canal. This would be extremely dangerous.

The Free World must have tremendous quantities of oil to prevent economic chaos. With the Middle East now holding three-fourths of all the world's known unproduced oil reserves, the industrial welfare of much of the Free World depends on the availability of Middle East oil. Western Europe's economy in particular has come to be dependent on oil, primarily Middle East oil. This will be increasingly true in the future.

But the repercussions from any stoppage of Middle East oil shipments is world wide. Even the national security of the U. S. would be severely undermined. Therefore, the vulnerability of westward oil shipments from the Middle East is the weakest link in the Free World's economy—also in its military strength.

Since it seems impossible to fully insulate the canal against Egyptian politics, Western nations must find ways to reduce their life-or-death dependence on the Canal. They have no other choice.

•

Oil can play a vital role in alleviating the Free World's dependence on Suez. It has much at stake. Furthermore, oil has a better opportunity to bypass the canal than most industries.

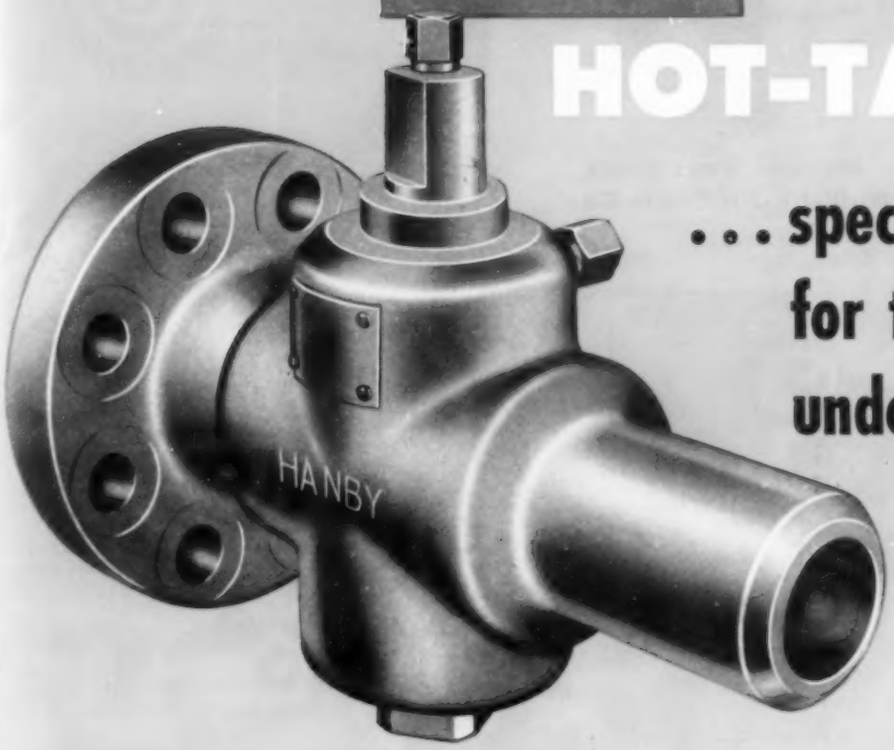
Oil pipe lines can be built from Middle East producing regions to the eastern end of the Mediterranean Sea. More giant super-tankers also can be built to make shipments around Africa economical.

Politically and militarily, super-tankers have much in their favor. They would be less vulnerable to unfriendly acts. They would be farther from both Russia and Egypt. However, economics must also be considered.

Therefore, both proposals need to be given serious study. A decision should be reached as to which would offer the greatest dependability in the future. Then action should be taken without delay. The governments of Western Europe and the U. S. should actively support any steps to "beat" Suez. Continued dependence on the Suez is too dangerous to be risked.

Warren L. Baker

This NEW HANBY HOT-TAP VALVE



. . . specifically designed for tapping gas lines under pressure

GAS TRANSMISSION COMPANIES have been asking for a valve that is *specifically designed* for use in tapping gas lines under pressure . . . and *HERE IT IS.*

BODY . . . is a solid, one-piece forging with no bonnet to leak or bonnet bolts to corrode.

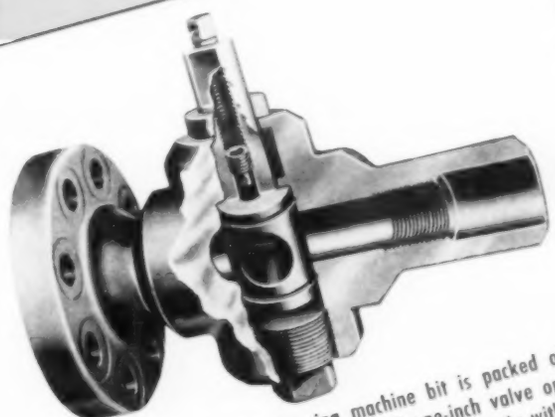
WELD-NIPPLE . . . of 2" diameter, in any desired length, is regularly furnished with 1" female internal threading two inches from the weld-end.

PLUG AND STEM . . . are of one-piece construction.

STUFFING BOX . . . is fully enclosed as part of the body and can be readily re-packed by inserting plastic packing through a removable set screw in the side.

In Addition . . .

. . . to hot-tap applications, this is an excellent blow-down valve for scrubbers and drips or low places in the line. Internal threading permits the use of a 1" syphon to the bottom of the pipe.



HOW IT WORKS! Tapping machine bit is packed off at flanged end and applied through the full one-inch valve opening and welding nipple. When tap is made, bit is sufficiently withdrawn to permit valve closure as shown by cross-section. Connections are then completed and valve re-opened.

Ask an "Oilwell" Specialist in Pipe Line Equipment to show you this Hanby Valve . . . or write for full information.

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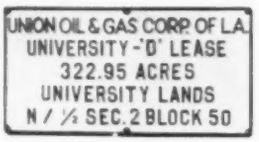

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WORLD OIL and THE COMPOSITE CATALOG for the drilling-producing-pipe line industry.

PETROLEUM REFINER and THE REFINERY CATALOG for the refining-natural gasoline-petrochemical industry.

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Indexed by Engineering Index and Industrial Arts Index

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CATERPILLAR TRACTOR CO.

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This is to certify that the Diesel Engine herein described has been engineered, manufactured and tested in accordance with rigid Caterpillar Standards. The materials and workmanship incorporated into this engine give it the inherent capacity for satisfactory performance when applied in accordance with the power ratings established and recommended by this company. The MAXIMUM OUTPUT capacity of this standard production engine is 200 H.P. @ 2000 R.P.M. equipped with: air cleaner, water pump, lubricating oil pump, fuel pump, and standard intake and exhaust manifolds.

I certify that B. L. Henson, Supervisor of Diesel Engine Test, Caterpillar Tractor Co., [illegible] Certification and I affix my [illegible] 19 57

[illegible] /58

B. L. Henson
Supervisor Diesel Engine Test
Caterpillar Tractor Co.
Peoria, Illinois

Caterpillar Model D326 Industrial was manufactured and shipped as follows: Engine Serial No 39B1018 Shipping Date February 11, 1957

Power Setting 152 H.P. @ 1600 R.P.M. Intermittent Power Rating

Radiator & Fan	Tachometer Drive
Ether Starting Aid	Muffler
32V Charging Generator	Heater Connections
Governor Control	Remote Shut-off

POWER RATINGS

MAXIMUM OUTPUT is the horsepower capacity of the engine, a measure of the maximum power, at 5% that can be developed for five minutes without drop in speed.

INTERMITTENT HORSEPOWER is a rating for use in variable load applications such as excavators, hoists, and standby power units, where the duration of sustained full power output is one hour or less, with the average output not over 80% of Intermittent Horsepower.

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CONTINUOUS HORSEPOWER is a rating for use in applications such as work boats and pumps where the duration of sustained full power output is 24 hours per day, day in—day out.

Horsepower figures are established in accordance with rigid Caterpillar standards. All ratings, corrected to sea level barometric pressure 29.92 in. Hg. and standard temperature 60° F., apply to a production engine including air cleaner, water pump, lubricating oil pump, fuel pump and standard intake and exhaust manifolds. The above ratings are based on British and American BHP.

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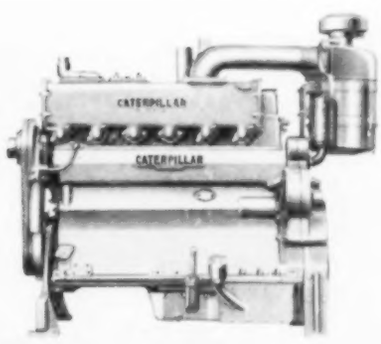
Caterpillar Tractor Co., Peoria, Illinois, U. S. A.



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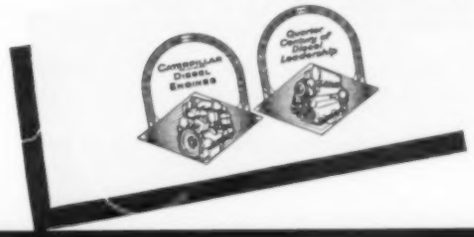

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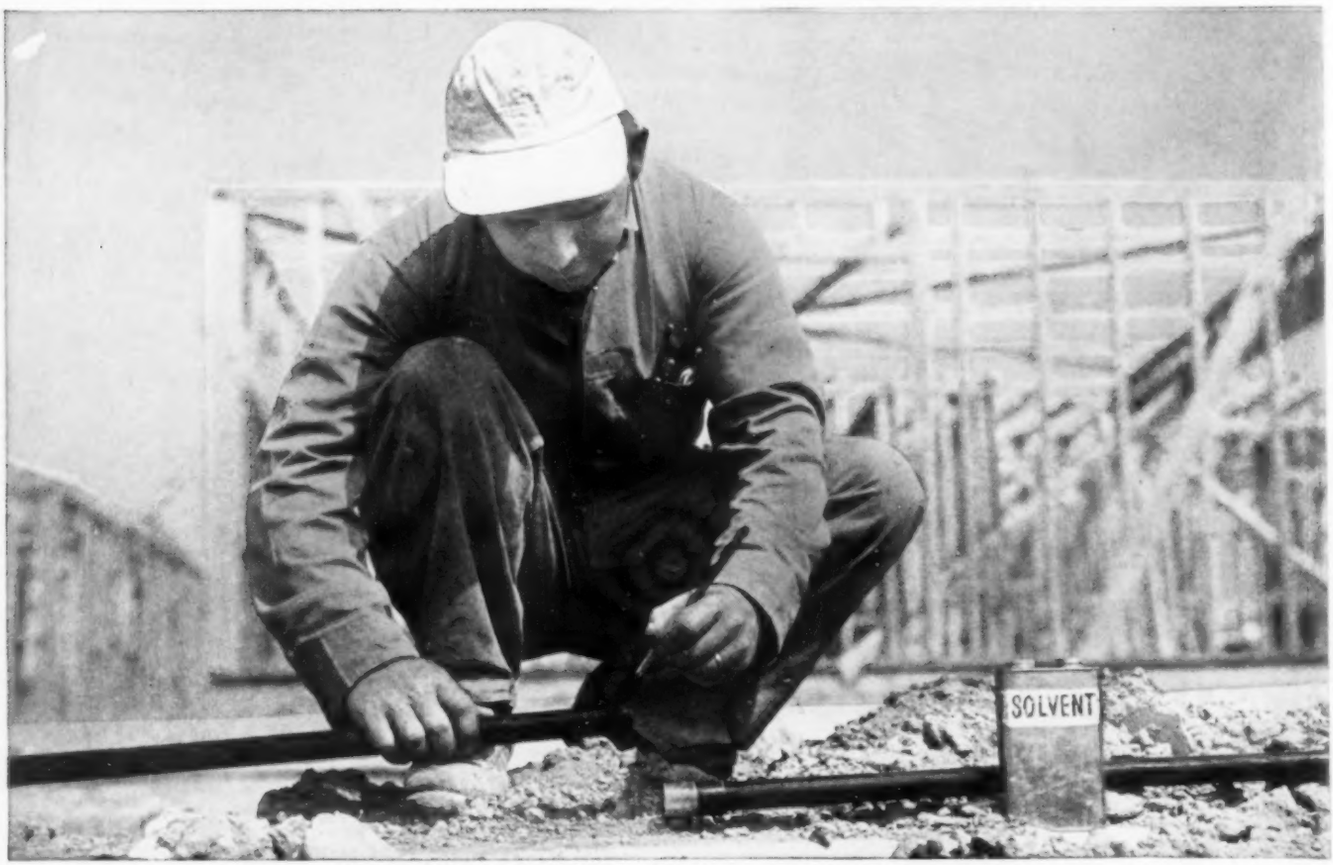

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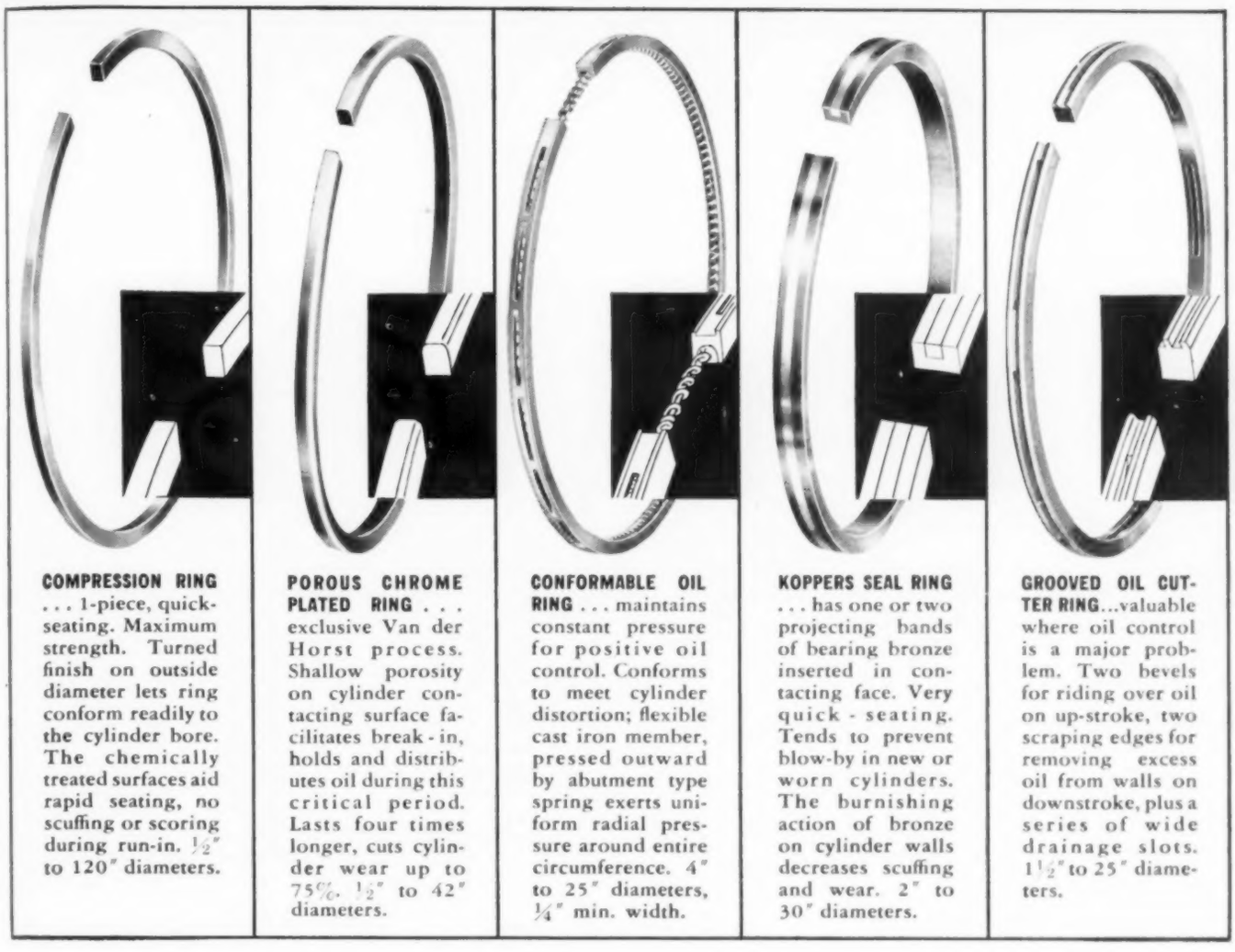

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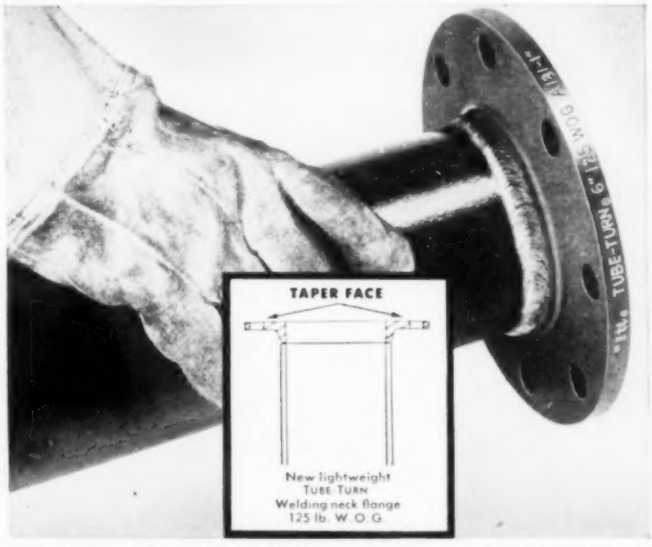

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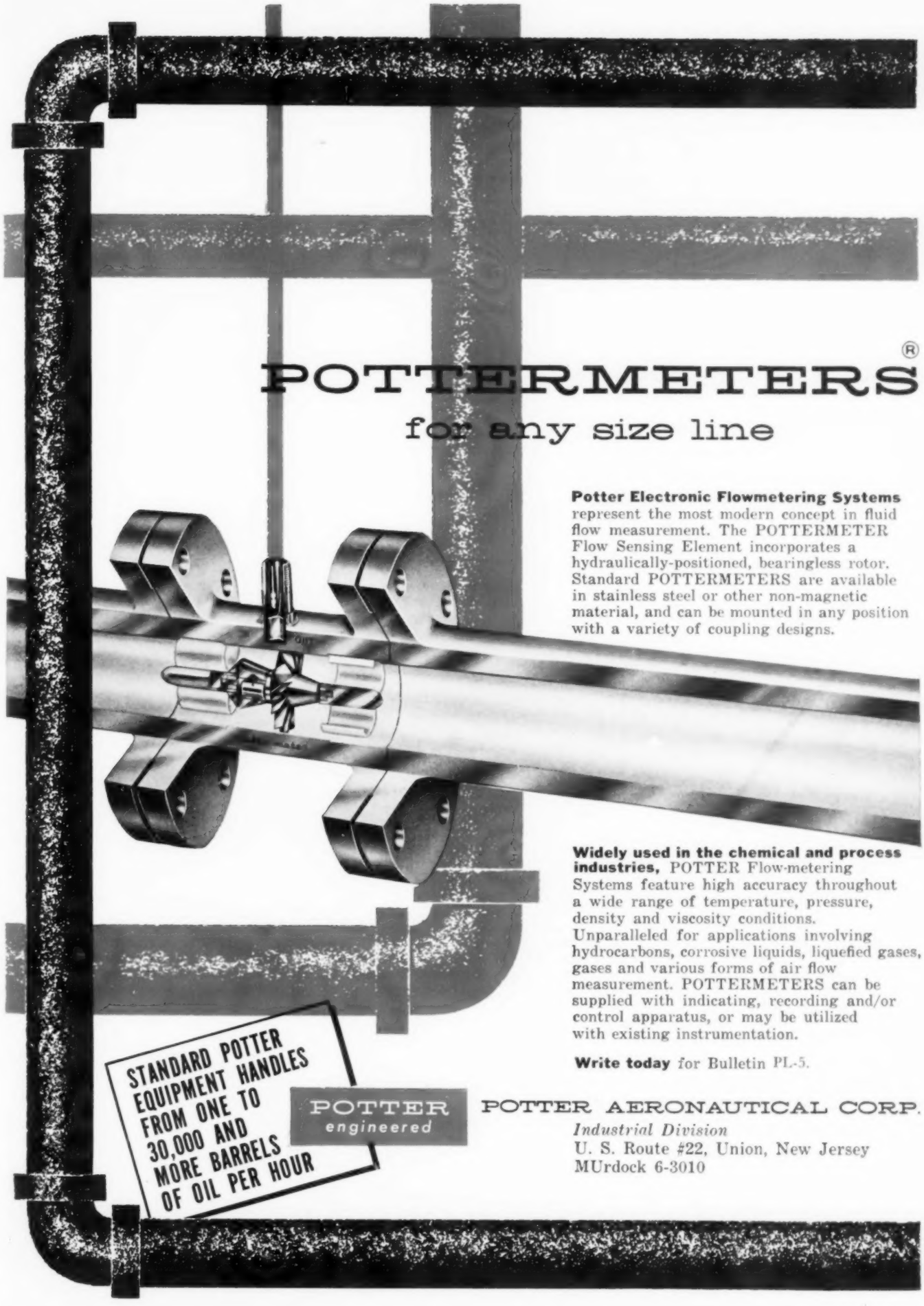


POTTERMETERS®

for any size line

Potter Electronic Flowmetering Systems represent the most modern concept in fluid flow measurement. The POTTERMETER Flow Sensing Element incorporates a hydraulically-positioned, bearingless rotor. Standard POTTERMETERS are available in stainless steel or other non-magnetic material, and can be mounted in any position with a variety of coupling designs.

Widely used in the chemical and process industries, POTTER Flow-metering Systems feature high accuracy throughout a wide range of temperature, pressure, density and viscosity conditions. Unparalleled for applications involving hydrocarbons, corrosive liquids, liquefied gases, gases and various forms of air flow measurement. POTTERMETERS can be supplied with indicating, recording and/or control apparatus, or may be utilized with existing instrumentation.

Write today for Bulletin PL-5.

STANDARD POTTER EQUIPMENT HANDLES FROM ONE TO 30,000 AND MORE BARRELS OF OIL PER HOUR

POTTER *engineered*

POTTER AERONAUTICAL CORP.
Industrial Division
U. S. Route #22, Union, New Jersey
MUrdock 6-3010

For more data on advertised products, use Readers' Service Cards, last page.

Presenting the NEW BS&B Phanto-Matic . . .

LEASE SYSTEMS

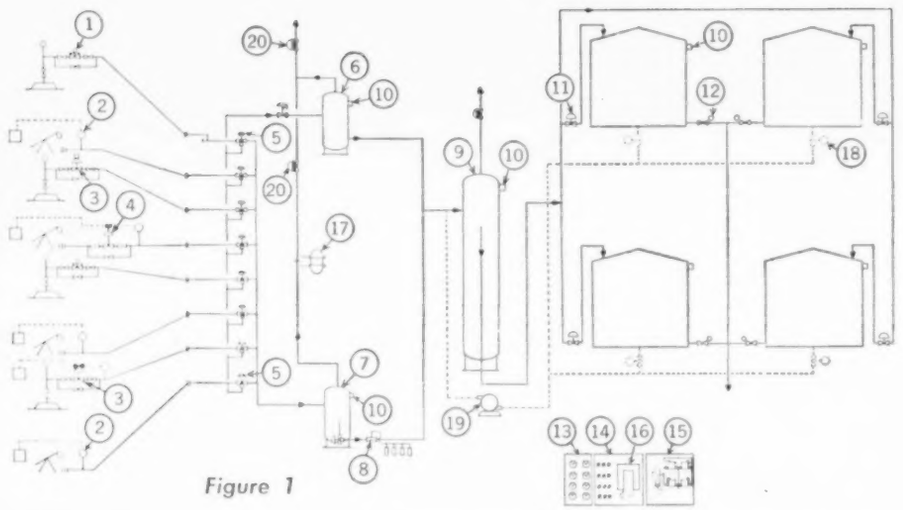


Figure 1

Legend:

1. Excess Flow Valve (Flowing Well)
2. Electrical Pressure Switch (Hi or Hi-Lo Shut-In on Pumping Well)
3. Pneumatic or Electro-Pneumatic Shut-In Valve (Hi or Hi-Lo Shut-In on Flowing Well)
4. Electro-Pneumatic Shut-In Valve (Hi or Hi-Lo Shut-In on Pumping Well)
5. 3-Way, 3 Position Header Valves
6. Production Separator
7. Metering Separator
8. Sampler W/Containers
9. Emulsion Treater
10. Hi-Level Detectors
11. Tank Fill Valves
12. Pipeline Valve Switches
13. Well Flow Controller
14. Well Test Controller
15. Battery Controller
16. Strip Chart Recorder
17. Integrating Flow Meter
18. Plug Valve Actuators
19. Rerun Pump
20. Gas Back Pressure Valve

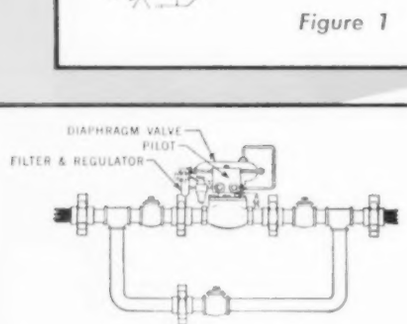


Figure 3

Wellhead Shut-In Control Assembly

THE PHANTO-PUMPER . . .

Is the name BS&B has given to its Automatic Control Systems which perform the following functions:

1. Wellhead Shut-In
2. Well Testing and Data Recording
3. Well Flow Programming
4. Tank Switching

Figure 1 typifies an automatic lease with PHANTO-PUMPER controls. The "nerve center" of any BS&B PHANTO-MATIC Lease System is the group of electrical controllers numbered 13, 14, 15 and 16.

AUTOMATIC WELLHEAD SHUT-IN EQUIPMENT . . . will control any combination of well flowing or pumping conditions. Examples of this equipment are:

1. Excess Flow Shut-In Control Assemblies
2. Hi-Low Pressure Shut-In Control Assemblies (Figure 3 at left)
3. Motor Shut-In Pressure Switch Assemblies
4. Electro-Pneumatic Motor Shut-In Pressure Switch and Control Valve Assemblies.

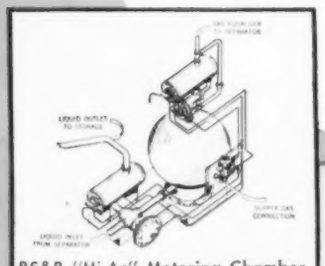
ELECTRO-PNEUMATIC WELL TEST CONTROL EQUIPMENT . . . automatically controls well test programming, routes the flow through test equipment and records test data. Some of the equipment offered as a part of this system includes:

1. Well Test Header and Manifold Assemblies With 3-Way Routing Valves and Master Lease Safety Shut-In Valve.
2. Electrical Well Test Controller With Strip Chart for Recording Well Test Data.
3. Liquid and Gas Metering Equipment, Including Complete Lines of Metering Separators, Metering Chambers, and Metering Treaters.
4. Liquid Sampling Equipment.

ELECTRO-PNEUMATIC WELL FLOW CONTROL EQUIPMENT . . . automatically programs flow from wells by "stop-cocking" at a central header. Some of the equipment offered as a part of this system includes production header and manifold assemblies with "stop-cocking" valves — or with 3-way routing and "stop-cocking" valves when combined with well test.

PHANTO-SWITCHER ELECTRO-PNEUMATIC TANK BATTERY CONTROL EQUIPMENT . . . automatically fills all tanks to capacity in a pre-set sequence, and automatically by-passes tanks already full or being run to the pipeline. Tanks can be selectively locked out of sequence for cleaning or inspection. If all tanks become full or otherwise unavailable for filling, the controller will automatically shut in system or actuate an alarm circuit.

Phanto-Pumper Control Panel



BS&B "Hi-Ac" Metering Chamber

Well Test and Well Flow Control Manifold

EFFICIENCY
OVER 60 YEARS
BS&B
RELIABILITY
ANOTHER EXAMPLE OF PRODUCT LEADERSHIP

For Complete Lease Automation From Wellhead To Pipeline — Including Wellhead Shut-In Control...Well Test Control... Well Flow Control...Automatic Tank Switching... Automatic Custody Transfer...Fluid Metering... Lease Safety Controls — All Packaged For Easy Field Installation!

BS&B PHANTO-MATIC Lease Systems are packaged from a wide selection of equipment components, thoroughly tested under field operating conditions. These systems, when grouped according to function, fall generally into two primary classifications—PHANTO-PUMPER and PHANTO-GAGER.

THE PHANTO-GAGER...

Is the name BS&B has given to its Automatic Control Systems which perform the following functions:

1. Automatic Measurement and Recording of Temperature Compensated Oil Volume in Barrels.
2. Automatic Measurement (or Automatic Sampling and Subsequent Determination) of Quality and Contaminant.
3. Automatic Running of Crude From a Lease Into Connecting Pipeline in Accordance with Predetermined Schedules on an Unattended Basis.

Figure 2 typifies an electro-pneumatic, volumetric metering tank type automatic custody transfer system. This system is offered in various sizes as a skid-mounted assembly, with single or multiple metering and surge tanks.

Fail-safe controls throughout the system insure that no oil will be lost in case of power failure. Oil cannot be introduced into the metering vessel after the measuring cycle has started, nor can oil be removed from the meter tank (other than to the pipeline) after the top gage has been made and before the run is completed.

For Further Information, Contact Your Nearest BS&B Representative—or Write To...

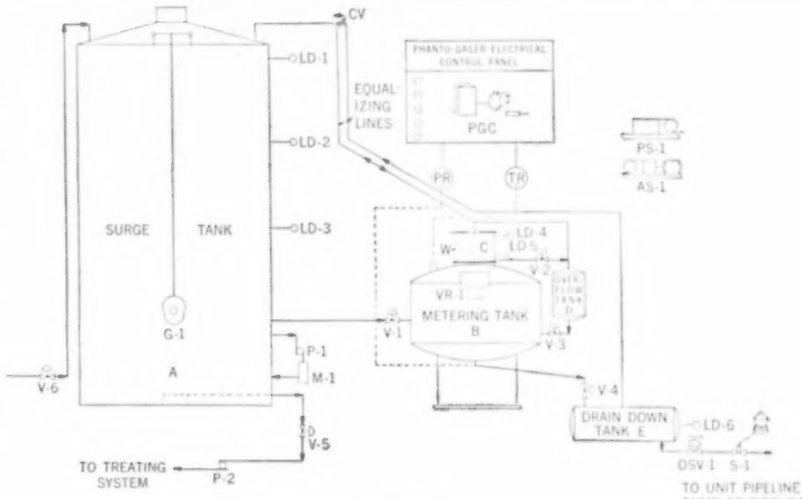


Figure 2

Legend:

LD	— Level Detector	VR	— Temp. Comp. Volume Recorder & Printer	AS	— Air Supply Unit
V	— Valve			P	— Pump
CV	— Check Valve	TR	— Temperature Recorder	W	— Weir
M	— BS&W Monitor	PR	— Pressure Recorder	C	— Overflow Chamber
S	— Sampler	PS	— Power Supply Unit	OSV	— Oil Seal Valve
				PGC	— Phanto-Gager Controller

Phanto-Gager

BLACK, SIVALLS & BRYSON, INC.

Oilfield Equipment Division, Dept. 1-EP5

P. O. Box 1714 Oklahoma City, Oklahoma

W-K-M VALVES
Smooth the way on the "Muskrat Line"

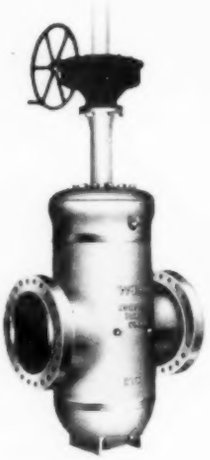
Two hundred million cubic feet of gas per day will flow smoothly through TGT's 355-mile "Muskrat Line." There'll be no turbulence — no restriction to flow set up by the mainline valves, because they are W-K-M Through-Conduit Parallel Expanding Gate Valves. These efficient valves assure full volume — smooth flow — all the way. Scrapers will go through them as easily as they do through the pipe.

The through-conduit design provides a valve bore the same I.D. as the pipe. The parallel expanding gate with LEVERLOCK* operation provides positive, easy opening and closing; upstream and downstream sealing; no surge closing. W-K-M Valves can be repaired, and seats replaced, if ever necessary, without removal from the line.

For proved performance and minimum maintenance, specify W-K-M Pipeline Valves. Ask your W-K-M Representative or write today for new Pipeline Valve Catalog #300.

*Trade Mark of W-K-M Manufacturing Company, Inc.

5616



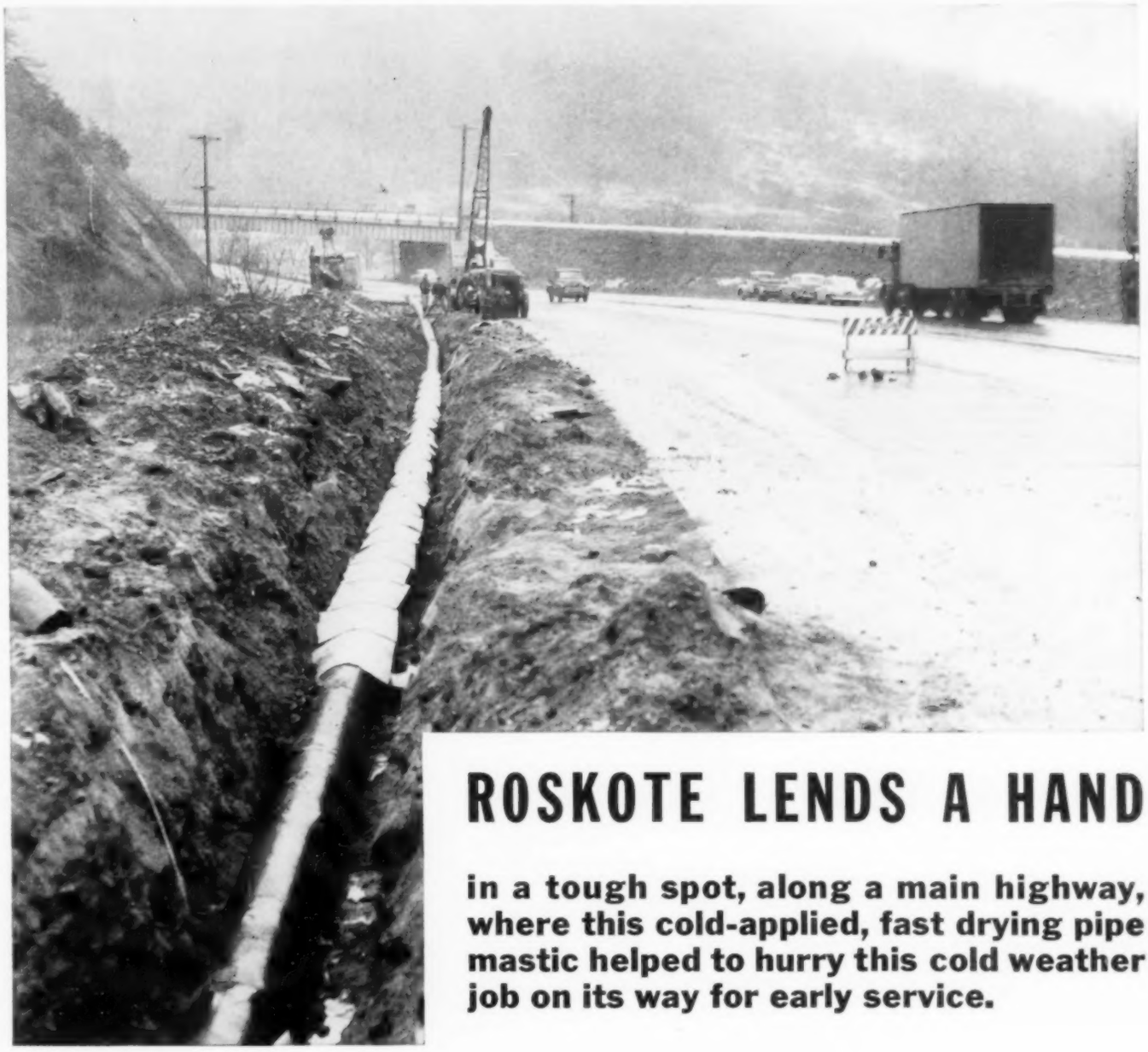
W-K-M

DIVISION OF acf INDUSTRIES INCORPORATED

PLANT: MISSOURI CITY, TEXAS • MAILING ADDRESS: P. O. BOX 2117, HOUSTON, TEXAS

MANUFACTURERS OF

W-K-M	acf	KEY
THROUGH-CONDUIT GATE VALVES	LUBRICATED PLUG VALVES	RETURN BENDS AND FITTINGS



ROSKOTE LENDS A HAND

in a tough spot, along a main highway, where this cold-applied, fast drying pipe mastic helped to hurry this cold weather job on its way for early service.

A large portion of Equitable Gas Company's 18½ mile "Delmont Line" of 16" pipe, was laid 3 feet from the edge of U.S. 22. Cold application of Roskote was ideally suited because of limited working space and it accelerated completion of the line. The pipe was given two coats of Roskote Cold Applied Pipe Mastic and a wrapping of felt. Pipe line padding was used where undesirable backfill was present. For complete information on Roskote, with its high resistance to electrolytic and chemical corrosion, write:

ROYSTON LABORATORIES, Inc., Box 112-D, Blawnox, PITTSBURGH 38, PA.

District Sales Offices:

P. O. Box 1084
Atlanta, Georgia

P. O. Box 1753
Tulsa, Oklahoma

P. O. Box 8188
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3114 Midvale Avenue
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Overton Sales Equipment Co.
5981 Fairmount Extension
San Diego 20, Calif.

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Manufacturers Of: Roskote Pipe Mastics • Roylac Aluminum Finish • Oil and Gasoline Resistant Mastics • Vinachrome Primer • Orco Insulation Tape • Roybond A-36 Adhesive • Aluminum Mastic • Pipe Storage Primers • Roskoter Coating Device • Royston Glass Wrap • Endseals

Distributors Of: Polyken Tape • Dow Magnesium Anodes • Pipeline Felt • Glass Pipe Wrap • Pipeline Padding

For more data on advertised products, use Readers' Service Cards, last page.

TD-24 Sideboom spots twisted pipe with

precision control inch-close accuracy!

Have a close look at the gulch-crossing, grade-climbing course this new Pacific Gas and Electric Company line takes in Jackass Pass near Mendota, California—on a section being laid by Midwestern Constructors, Inc., Tulsa, Oklahoma. Then you'll appreciate the special TD-24 spread-speeding, pipe-handling precision that earns high praise from the boss:

Earl R. Wolfe, pipe-lowering and tie-in foreman on the spread, reports: "With the International Superior TD-24 side-boom tractors I've been able to fit twisted pipe into the ditch many times without cutting. And that means in places where with other tractors, the pipe would have had to be cut. My welders have it easy. I don't known of any other side-boom equipment that could handle the 34-inch pipe on this mountain operation so well."

Control Begins with Planet Power steering!

This twisted-pipe-spotting, precision handling control begins with exclusive International TD-24 Planet Power steering. You can feed full-time live power to both tracks smoothly and steadily—to turn as sharply or gradually as desired—without eccentric, jerky travel even with heavily-loaded boom!

Exclusive TD-24 finger-tip hydraulic braking and foot decelerator help give positive pipe-carrying control by exact regulation of tractor motion. And with minimum operator effort, from reach-easy control lever clusters, the International Superior TD-24 gives you amazing *response* speed, and *inch-close* accuracy of boom action control!

Get on-the-line proof of the big, exclusive International Superior TD-24 precision, spread-speeding advantages. Compare new bonus-powered TD-18, TD-14, and TD-9 side-booms to any other units in their size classes. See your International Construction Equipment Distributor for a demonstration of the boom and tow equipment you need!

Grades on this mountainous section of new 34-inch P.G. & E. gas line ranged from 37% to 57%. Yet time and again, the boom team saved vital, weather-beating hours—using outstanding International Superior TD-24 side-boom precision control to lay twisted pipe without cutting! Picture shows Midwestern's TD-24 side-booms working as a team!

INTERNATIONAL®

SUPERIOR®

International Harvester Co., 180 N. Michigan Avenue, Chicago 1, Illinois

A COMPLETE POWER PACKAGE INCLUDING: Crawler, Wheel, and Side-Boom Tractors ... Self-Propelled Scrapers and Bottom-Dumps ... Crawler and Rubber-Tired Loaders ... Off-Highway Trucks ... Diesel and Carbureted Engines ... Motor Trucks

the INSLEY "pipeliner" ...a machine built for pipeline work

The Insley "Pipeliner" is the hard-working answer to the contractor's need for a machine especially designed for pipeline work . . . a machine with "built-in" durability and stamina that will withstand the severe operating conditions of cross-country pipelining.

- **Wide, deep carbody with removable bottom cover plates**
- **Crawler rollers and tumblers sealed against dirt**
- **Two-speed travel (optional) through two-speed transmission .8 M.P.H. and 1.6 M.P.H.**
- **Increased stability and flotation with 12'-6" crawlers and 24" or 30" shoes**
- **Long wearing, heat-treated, alloy steel crawler shoes and pins**

The "Pipeliner" is fully convertible for hoe, shovel, dragline, clamshell and crane work, and is available with gasoline or diesel power. See your Insley distributor for full details or write direct to Insley.

THERE'S AN INSLEY WORKING NEAR YOU

Let Your Insley Distributor Show You an Insley at Work

INSLEY MANUFACTURING CORPORATION
INDIANAPOLIS, INDIANA

The biggest mistake is the one you can't see!

As an experienced pipeline man, you'll have little trouble spotting four obvious "errors" in this picture*. But the *biggest* and most *costly* error you can make in pipeline construction is to gamble on unproven or "economy" types of pipeline protection.

Sure, you can buy "protection" that will save you a few first-cost dollars. But wait until you start paying the bills for excessive cathodic protection!

On line after line, in marshlands and mountains, tough, durable *Pitt Chem* Coal Tar Enamels have *proved* their superior ability to resist soil stress and water absorption, the two pitfalls of "economy" coatings. It's the kind of protection that gives you maximum insurance against high maintenance cost.

When you specify *Pitt Chem* you get assured quality, for *Pitt Chem* Coal Tar Enamels are manufactured to rigid, *published* specifications, from highest grade materials.

How can we help you! Send us the details of your coating problem.

*Operating from left side of ditch; man standing on line; man in ditch under line traveling machine; loop in "Hoosier" pole.

PITT CHEM® TAR BASE ENAMELS

- Standard Grade
- Modified Grade
- Plasticized Grade
- Hotline
- Cold Applied Tar Base Coatings

PROTECTIVE COATINGS DIVISION
PITTSBURGH COKE & CHEMICAL CO.
Grant Building • Pittsburgh 19, Pa.

WSW 6587

COAL CHEMICALS • PROTECTIVE COATINGS • PLASTICIZERS • ACTIVATED CARBON • COKE • CEMENT • PIG IRON

HD-21 *(Illustrated)*

Hydraulic torque converter drive

204 net engine hp

Weight—78,250-lb tractor and side boom with full counterweight

127,000-lb lifting capacity at 4-ft overhang

HD-16

Hydraulic torque converter drive (optional)

150 net engine hp

Weight—57,840-lb tractor and side boom with full counterweight

77,580-lb lifting capacity at 4-ft overhang

It's easy to handle the pipe when it's easy to control the machine

CRADLING or lowering in pipe on steep hillsides or in mucky swamplands demands a crawler operator's full attention. That's why operators appreciate the many easy-operating features of an Allis-Chalmers crawler tractor and Tractomotive side boom. They provide precise maneuvering with a minimum of effort.

Finger-tip hydraulic booster steering

on the HD-16 and HD-21 requires only 3- to 5-lb pressure on the controls. Self-energizing brakes make brake-clutch coordination especially easy. They require less pedal pressure and take hold with a firm, uniform grip.

Easy-working side boom levers

Counterweights extend or retract smoothly in response to finger-tip pressure, enabling operator to maintain precise balance even on rough terrain. Side boom levers are within easy reach of operator and spaced to give ample hand room.

Matches speed automatically

The operator merely advances or retards throttle to synchronize tractor speed to that of cleaning-priming or doping-wrapping machines. There's no need to shift or slip the clutch with Allis-Chalmers hydraulic torque converter drive. Operator's hands are free for side boom work. Hydraulic torque converter drive, pioneered and proved in crawler tractors by Allis-Chalmers, is standard on the HD-21 and optional on the HD-16.

Greater operator comfort

Add to these advantages roomy, adjustable cushion seats, wide arm rests, electric starting, and it's easy to see why an operator does more with less effort when he's behind the controls of an Allis-Chalmers-Tractomotive combination. Let your dealer prove it with a demonstration.

TRACTOMOTIVE CORPORATION, DEERFIELD, ILLINOIS

TRACTOMOTIVE

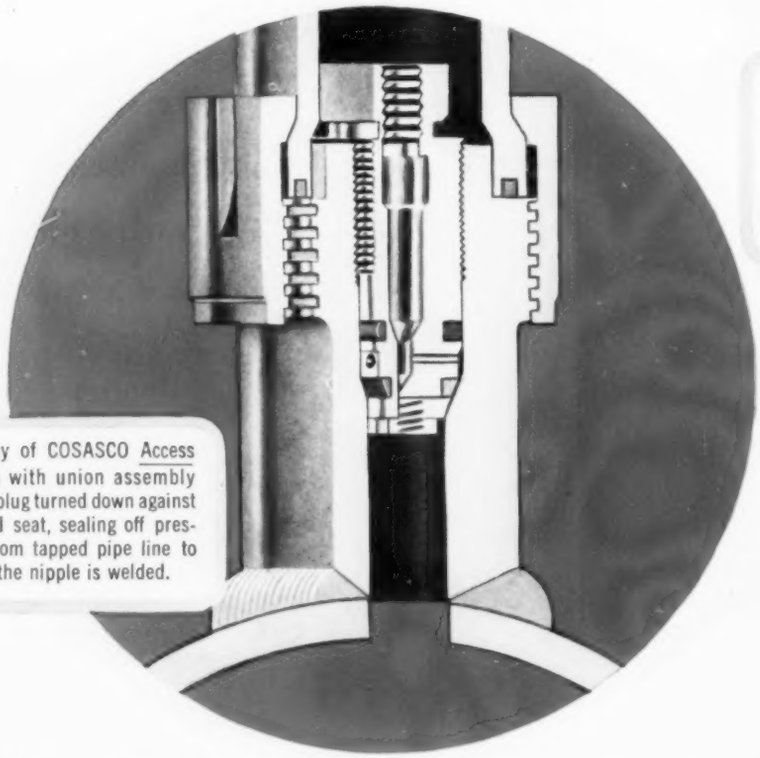
ALLIS-CHALMERS, CONSTRUCTION MACHINERY DIVISION
MILWAUKEE 1, WISCONSIN

ALLIS-CHALMERS

SAFE

entry against pressure

...to insert instruments, replace valves, investigate corrosion!



Cutaway of COSASCO Access Nipple with union assembly shows plug turned down against tapered seat, sealing off pressure from tapped pipe line to which the nipple is welded.

Removal and replacement of plugs is accomplished with a COSASCO "Retriever" (lubricator) of required stroke and a full-opening valve.

COSASCO *Access* Nipples give you safe and easy entry into well heads, refinery vessels, storage and transmission equipment *without interfering with operations*. They also replace expensive valves and permit removal of other externals *without loss of pressure or product!*

The COSASCO *Access* Nipple has a removable threaded plug of type 303-304 stainless steel which seals off the nipple when turned down against the tapered seat. This plug is readily replaced by special plugs for inserting corrosion coupons, water samplers, thermocouples, hydrogen probes, etc. The *Access* Nipple can also function as a gauge valve or bleeder valve.

What's your problem?

If you have an entry-against-pressure problem, we invite you to submit details. Send blue prints or drawings depicting the problem and we'll supply the COSASCO solution *without charge*. You will be under no obligation whatsoever for this service.

Protect equipment . . . save product

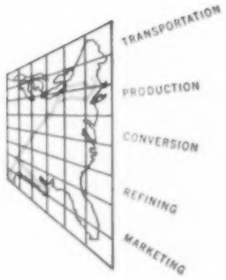
COSASCO DIVISION OF PERFECT CIRCLE CORPORATION

3463 Ocean View Boulevard, Glendale 8, California
Address Mail to P. O. Box 277, LaCanada, California
Export Office: 617 S. Olive Street, Los Angeles 14, California

PRIME SOURCE

The humming bird seeks the flower for food.
So fuel-hungry America looks to natural gas and oil for energy.
To fuel its furnaces, drive its cars, heat its homes, cook its food.
Today Tennessee Gas, operator of the nation's longest pipeline, also
is active in other basic phases of gas and oil . . . exploration, production . . .
extraction, conversion . . . refining, marketing. Fully equipped to
help supply the services and products that mean better living.

TENNESSEE GAS TRANSMISSION COMPANY
AMERICA'S LEADING TRANSPORTER OF NATURAL GAS
HOUSTON, TEXAS



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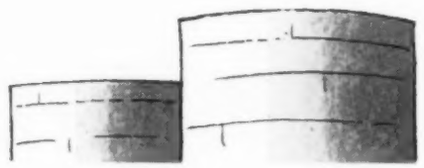
✓ EVAPORATION

✓ EXCESS STORAGE



Cut these Costly Losses

with metered pipeline deliveries of crude direct to the working tank

- Recorded measurement of every barrel put through the line assures more accurate inventories
- By metering direct to the working tank, fluid levels are more constant, with minimum loss of vapor-laden air
- Weathering losses are minimized through lower storage requirements and shorter time exposure of crudes to temperature changes
- Simultaneous input and withdrawal from working tank means minimum need for expensive storage tankage

The high capacity, sustained accuracy, and low maintenance requirements of Brodie BiRotor Meters in pipeline service are daily demonstrating a new concept of efficiency in connection with tank farm, refinery and field processing installations. For the complete story, contact the Brodie Metering Specialist near you.

BRODIE BiRotor METERS

ALL-STEEL TRUE-ROTARY

RALPH N. BRODIE COMPANY • San Leandro, California, U.S.A.

MT. VERNON, N. Y.	DALLAS 7, TEXAS	CHICAGO OFFICE:	SEATTLE 9, WASH.	LOS ANGELES 22, CALIF.
550 So. Columbus Ave.	167 Parkhouse St.	1227 Circle Ave., Forest Park, Ill.	221 9th Ave. N.	5401 Sheila Street

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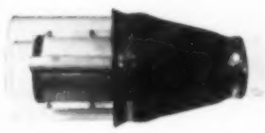
CROSSING INSULATORS & CASING SEALS . . .

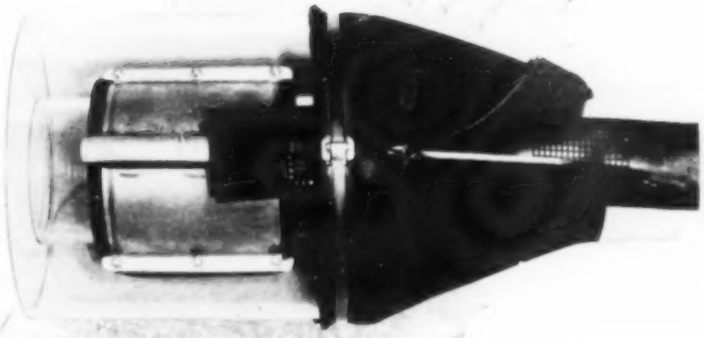
. . . FOR ANY JOB!

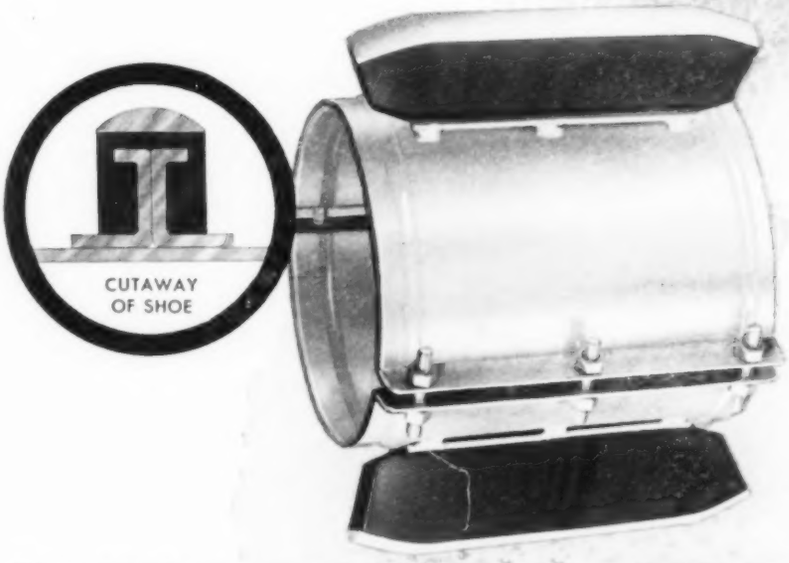


Maloney Zipper Type

Casing Seals

All neoprene used in the Maloney Seal (and insulator) is live resilient rubber. It is the best rubber that can be compounded.





The Maloney Model 55 Crossing Insulator

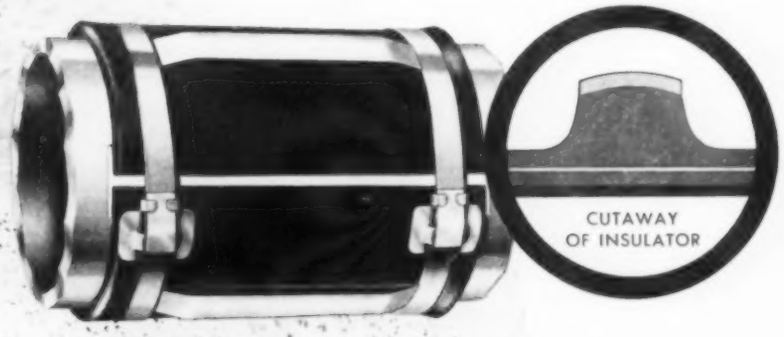
For all Sizes of Pipe

These insulators have superior insulation qualities because of the low moisture absorption and the long life compounded into the neoprene. The wide steel, sled type runners make installation easy. The extra wide band affords a positive grip. Bonded metal-to-neoprene-to-metal, the runner insulates and also permits flexibility to compensate for pipe shifting. Ribbed neoprene lining can be furnished if desired.

The Maloney Model 56 Casing Insulator

Manufactured in sizes from 2" through 12"

Manufactured with neoprene, which is vulcanized to the steel band core and to the rounded steel runners, there is no place to "short-out" between the casing and the carrier line. The steel core is completely surrounded with neoprene and is bonded under heat and pressure to give the same strength as on army tank tread blocks.



"Something from the Irishman"

F. H. MALONEY *Company*

Houston, Texas

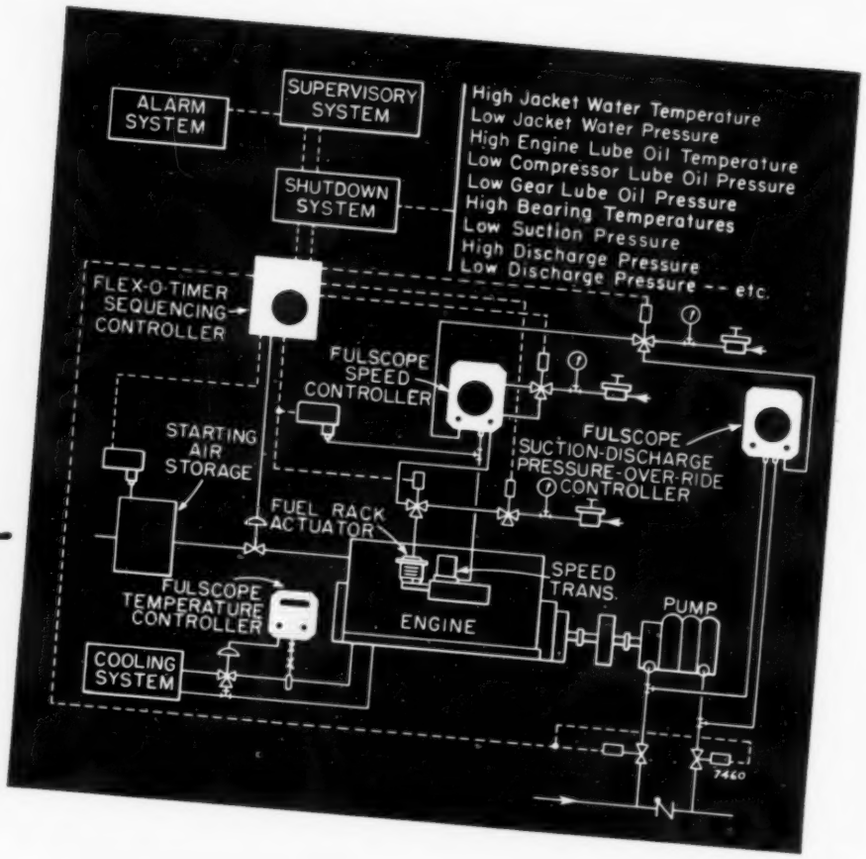
2301 TEXAS AVE. • FA 3-3161 • HOUSTON

LOS ANGELES • TULSA • OLEAN, N. Y.

SINCE 1932 — PRECISION IN RUBBER — METAL — PLASTICS

For more data on advertised products, use Readers' Service Cards, last page.

A dream materializes—



UNATTENDED PUMPING STATIONS NOW PRACTICAL WITH *Taylor* CONTROLS!

FULLY Automatic start-up and shut-down control of diesel or gas powered pumping stations has always been considered impractical in that the problem was either too complex or instrumentation was just not available. The schematic drawing above shows how a booster station can be provided with automatic start-up and shut-down, using standard Taylor instruments. This system can be applied to reciprocal or turbine gas engines or diesel engines—with remote or local initiation. Of course, this basic system can be modified to suit your specific needs, and flow or specific gravity signals can be incorporated.

The resultant benefits, in terms of reduced operating costs, are so great as to require no elaboration here. Why not call in your Taylor Field Engineer to analyze your present system and give you a quotation for "going automatic." Taylor Instrument Companies, Rochester, N. Y., and Toronto, Canada.

Typical System (above) for Automatic Start-up and Shut-down of Engines

START-UP:

1. Main line valves open.
2. Starting air on and fuel rack opened to starting position after valves are open. (Failure to start simply restarts sequence.)
3. Starting air of engine placed on proportional speed control to come up to idling speed.
4. Engine on proportional-plus-reset speed control for warm-up period.
5. Suction discharge pressure override system adjusts speed control point.

SHUT-DOWN:

1. Engine speed reduced to idling.
2. Fuel rack closed.
3. Main valves closed.

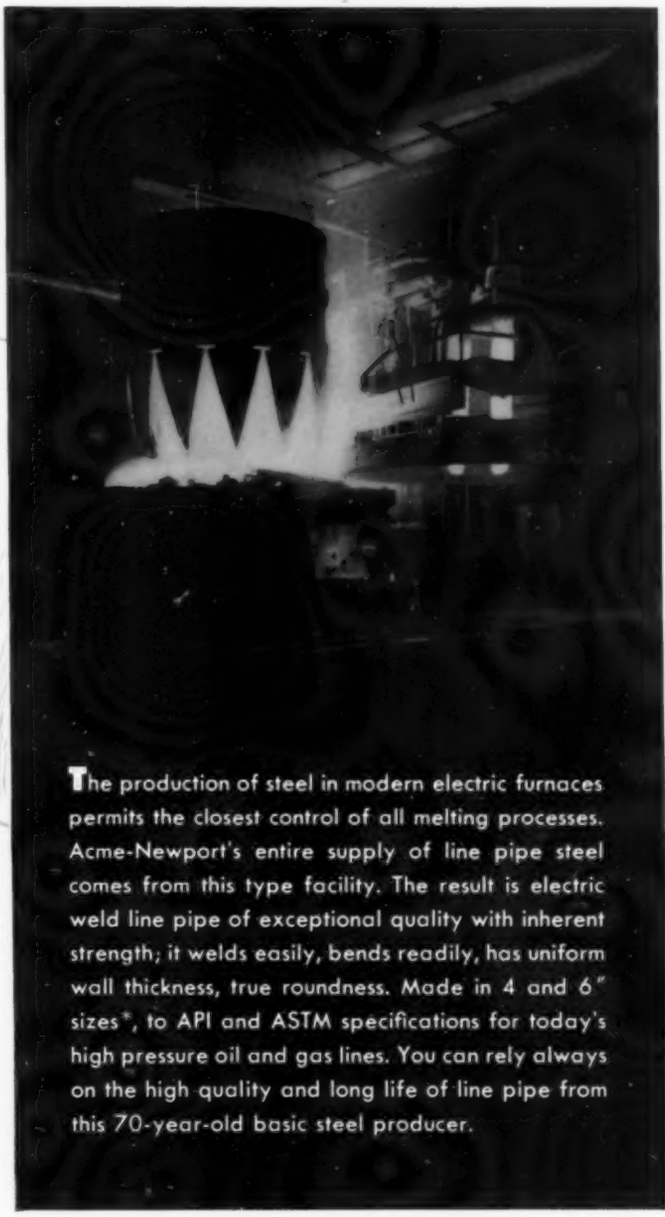
EMERGENCY SHUT-DOWN:

Engine fuel rack and main valves closed.

Taylor Instruments **MEAN ACCURACY FIRST**

LINE PIPE QUALITY BEGINS IN THE ELECTRIC FURNACE

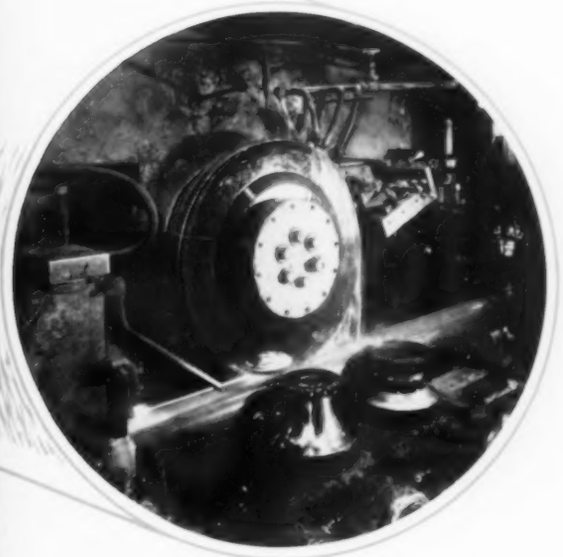
Acme-Newport Steel



The production of steel in modern electric furnaces permits the closest control of all melting processes. Acme-Newport's entire supply of line pipe steel comes from this type facility. The result is electric weld line pipe of exceptional quality with inherent strength; it welds easily, bends readily, has uniform wall thickness, true roundness. Made in 4 and 6" sizes*, to API and ASTM specifications for today's high pressure oil and gas lines. You can rely always on the high quality and long life of line pipe from this 70-year-old basic steel producer.

* SIZES AND WEIGHTS AVAILABLE

O.D.	Wall	Wt. Per Ft.
4½	.125"	5.84
	.142"	6.61
	.156"	7.25
	.188"	8.64
	.219"	10.00
	.237"	10.79
6⅝	.134"	9.29
	.156"	10.78
	.188"	12.89
	.219"	14.97
	.250"	17.02
	.280"	18.97



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Acme-Newport Steel COMPANY

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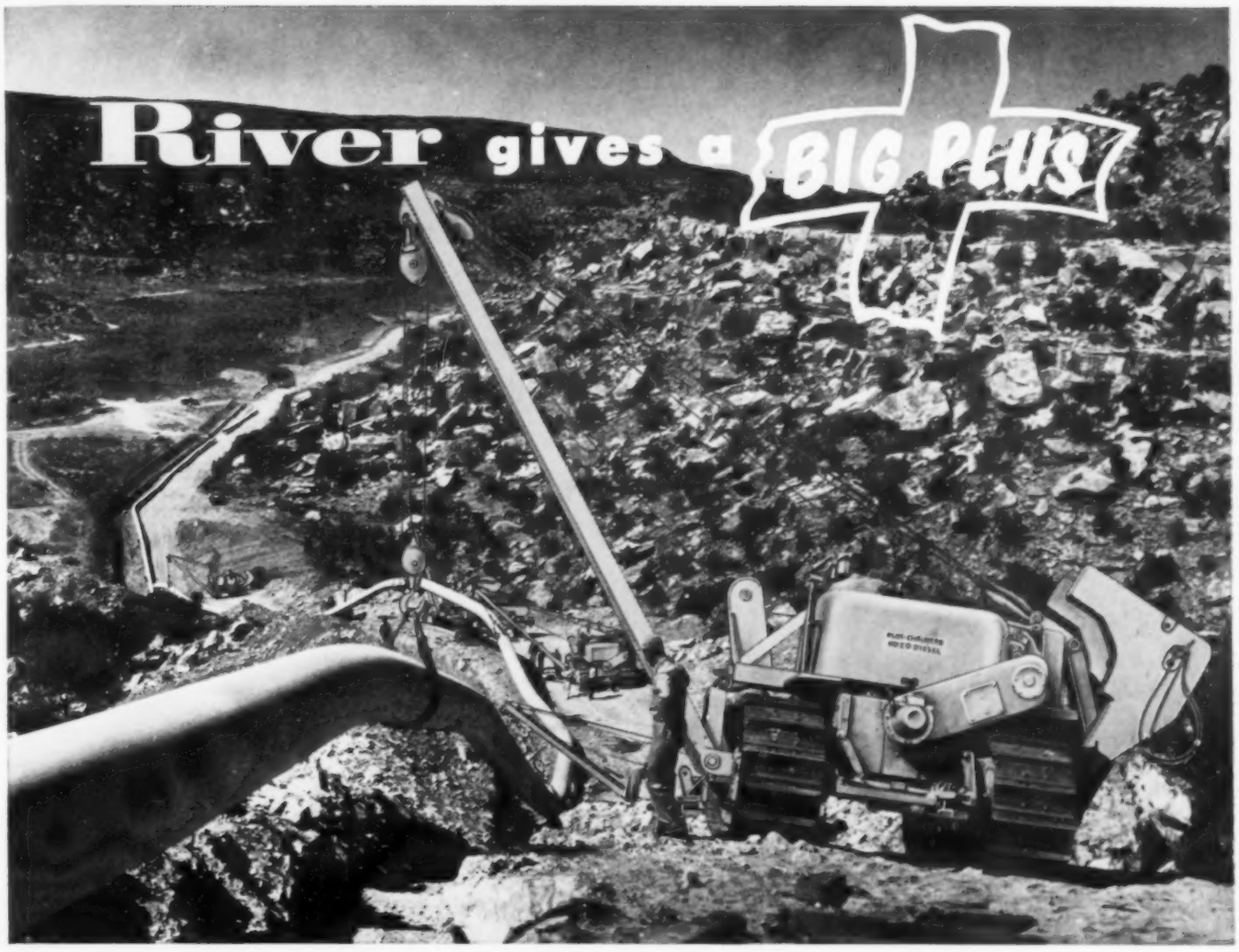

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From this experience comes the planning, equipment and trained crews needed to get the job done right and on time.
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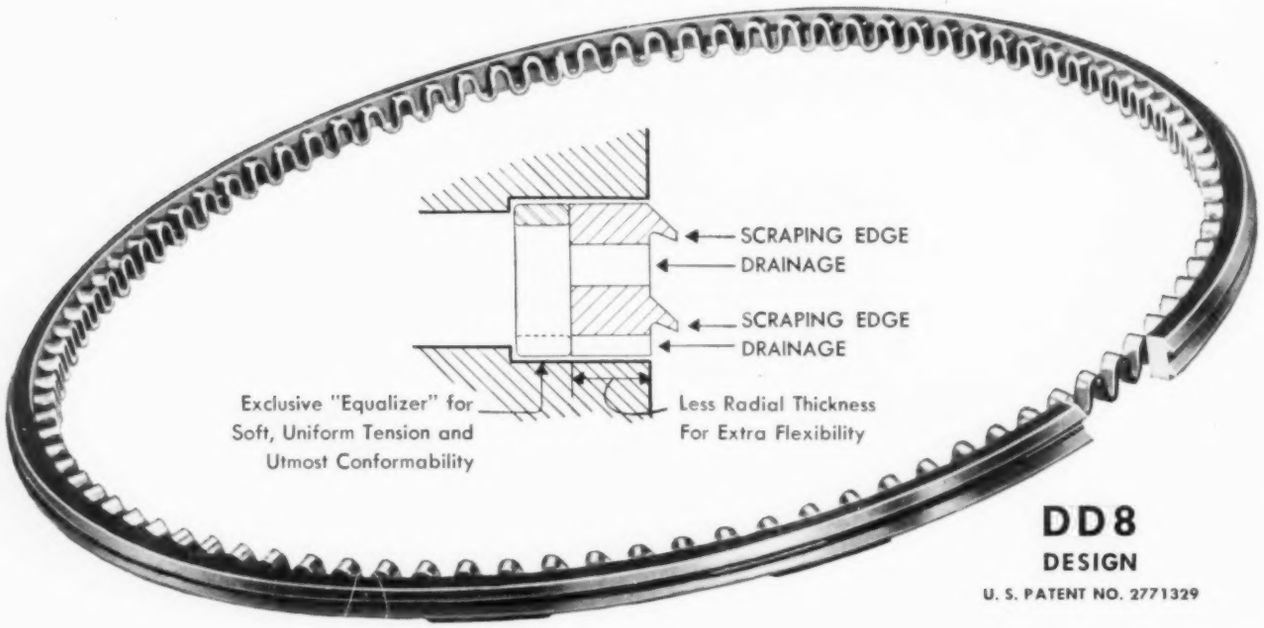

Pedrick Conformable FORMFLEX Double-Drain Oil Ring

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2. TWO sets of drainage channels or slots, one under each scraping edge.
3. Exceptional *conformability* for positive contact with the cylinder wall under even the most severe conditions.

Conformability is assured because of Pedrick's exclusive "Equalizer," a special design of steel expander which exerts a uniform pressure all the way around the cast-iron cylinder-contacting ring. The radial thickness of the cast-iron ring is less also, which increases its flexibility.

The Pedrick FORMFLEX Double-Drain DD8 oil ring, therefore, provides quicker, more effective drainage, and increased performance efficiency in all piston-groove styles. It is easy to install and moderate in cost.

This is just one of a family of top-flight ring designs which Pedrick has available to assure you long dependable, low-cost engine operation. Say the word and our engineers will be glad to consult with you. WILKENING MANUFACTURING CO., Philadelphia 42 and Toronto 2.

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VALVE CONTROL

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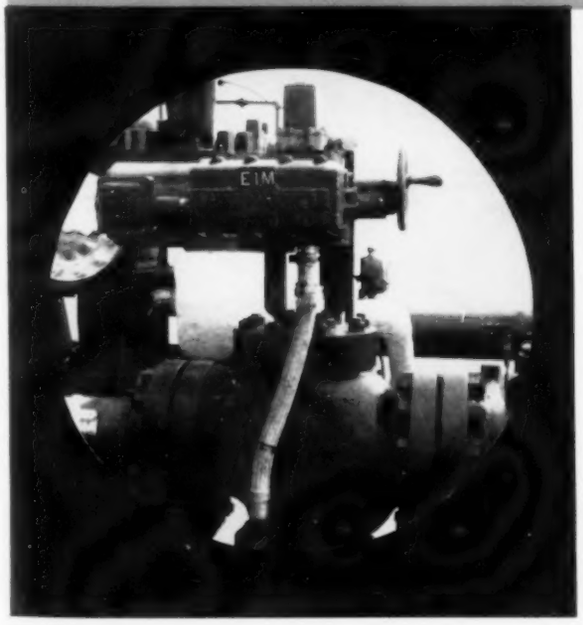
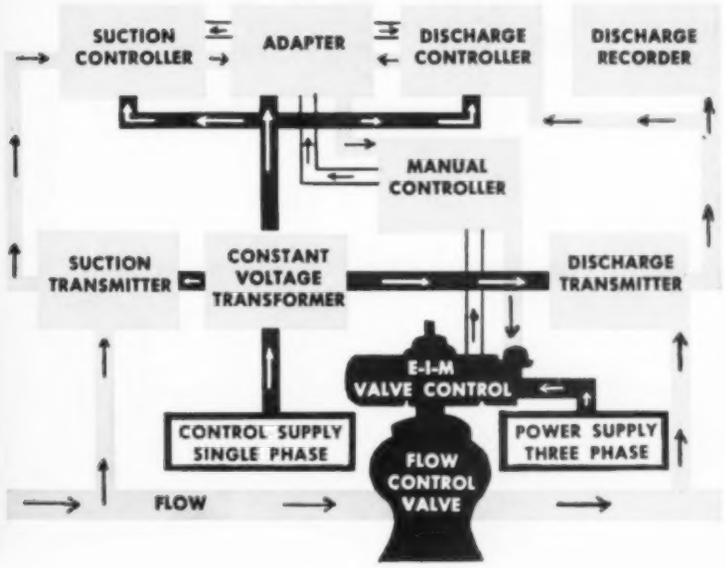
The FUTRONIC valve control system, is particularly valuable in meeting pipe line compressor station, pipe line pumping station and metering station requirements.

Units are adaptable for readout, cascading, computer and similar systems. Transmission distances of great length are permissible and it is possible to tie in with leased wire, micro-wave and other metering systems.





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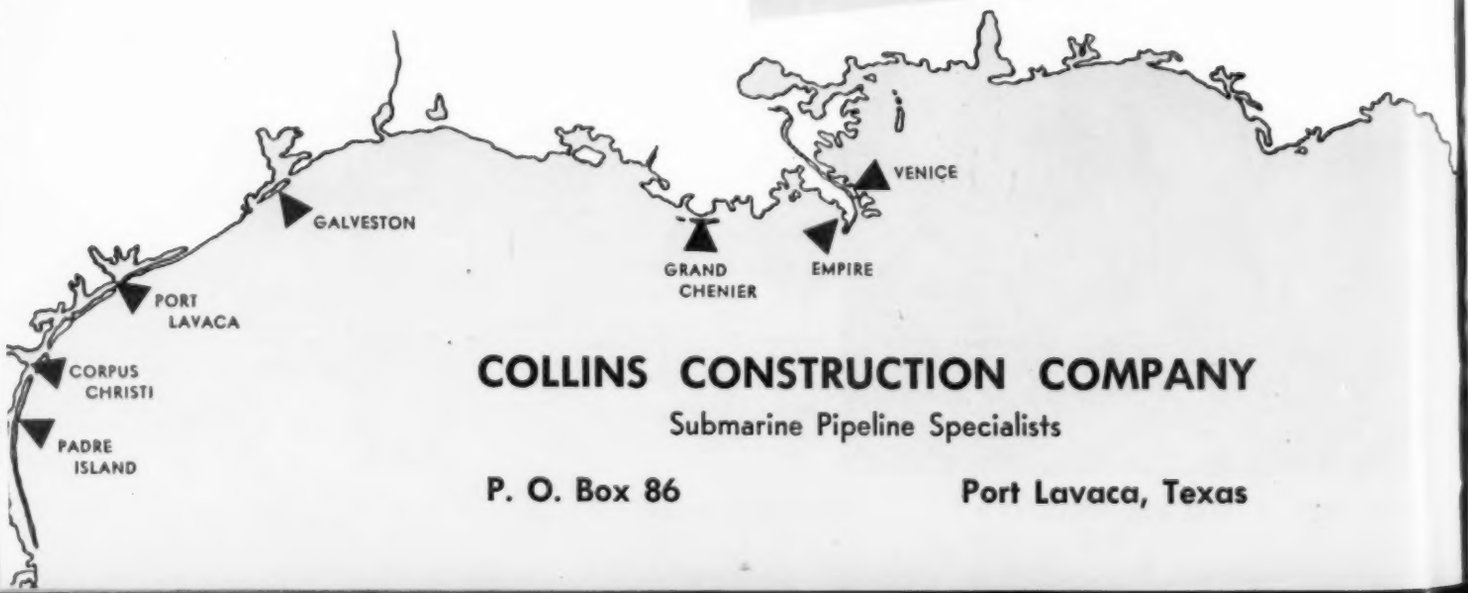
Let our worldwide experience and knowledge work for you in solving your submarine pipeline problem—along the Gulf Coast or anywhere in the Free World.



COLLINS CONSTRUCTION COMPANY

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PIPE LINE PANORAMA

Texas Pipeliners to Have Their Say . . . Producers have had their inning in the Railroad Commission hearings on the issue of pipe line connections for nearly 8400 Texas wells. Major charge: Alleged refusal of nine pipe line companies involved to connect these wells or to increase their trunk line capacities in the area.

Pipe Line Rebuttals will be made at May 13 hearing. At that time spokesmen are again expected to point out that common carrier pipe lines cannot legally purchase crude—can only transport. And they can transport only if producer has purchaser and terminal destination for his crude.

Issue is boiling down to two questions: (1) Are imports choking out markets for West Texas crude? (2) With their tariffs and profits held down by law, should pipe line companies be forced to install systems or increase capacities at an economic loss?

World's Longest Offshore Line . . . Tennessee Gas Transmission has temporary authority for FPC go-ahead to lay 12- to 26-inch line 55½ miles under the Gulf of Mexico, tapping rich natural gas reserves in East and West Cameron areas. The longest underwater line proposed to date, it will extend from shore near Grand Cheniere, La., about 25 miles to production in five Louisiana Gulf fields.

New Pipe Line Monopoly Probe . . . Government is girding for another pipe line industry investigation. This time it hinges around charges that major interests blocked West Coast pipe line proposal to build independent line from West Texas to California. Committee report may allege monopoly in pipe line transportation.

Will There Be a Natural Gas Bill? . . . Chances are looking slimmer for passage of new natural gas bill during this session of Congress. When—and if—it is passed, producers may have to settle for something less than freedom from regulation. New version (Harris-O'Hara Bill) appears to be set up, not to free producers, but to provide the most efficient means of regulation.

President Eisenhower says, "I thoroughly believe pipe lines are public utilities and must be treated as such, including the right to fix the price at which gas enters a pipe line."

Railroads and Pipe Lines . . . Great Northern Railway has hired Houston engineering firm to determine practicality of building pipe line to move Williston Basin crude from eastern Montana to St. Paul-Duluth areas. Butte and Service pipe lines are now moving the Williston crude.

A legal monkey wrench threatens to jam railroad oil and gas activities. Supreme Court recently ruled that government has mineral rights to railroad rights-of-way granted between 1862 and 1875. Other aspects of ruling might affect Southern Pacific's product line from El Paso to Los Angeles, as well as Great Northern's plans.

New Telemetering Method . . . Latest development in pipe line automation is system for telemetering continuous flow without tying up circuits or risking inaccuracies or shutdowns to re-synchronize readings. New system includes a unit which counts and stores impulses from a flow meter—a transmitting unit—a readout device. System is designed to fit into automatic custody transfer information.

Which Are More Economical—

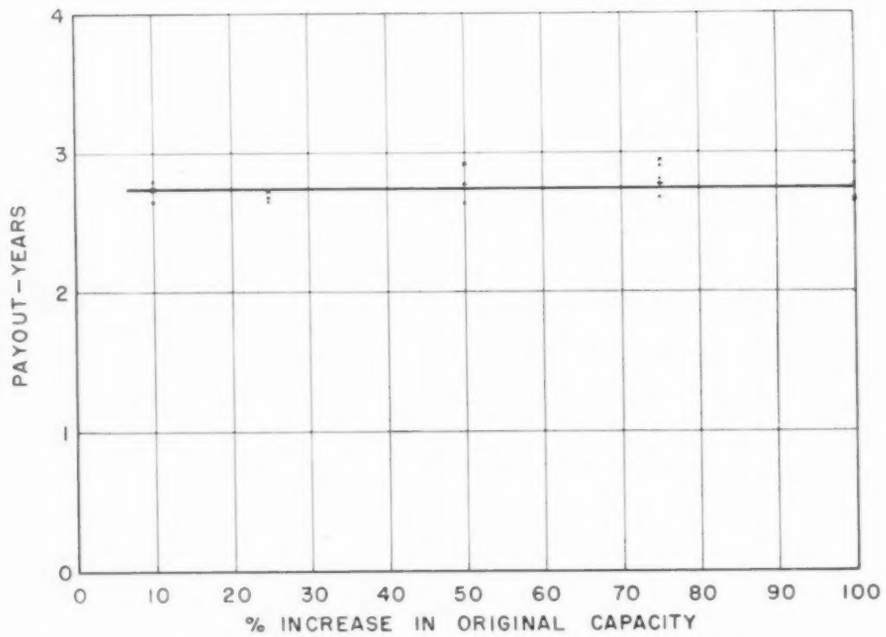


FIGURE 1—Comparing payout of an automatic station over a manned station. (8, 10 and 12-inch line at station spacings of 30, 50, 75 and 100 miles.)

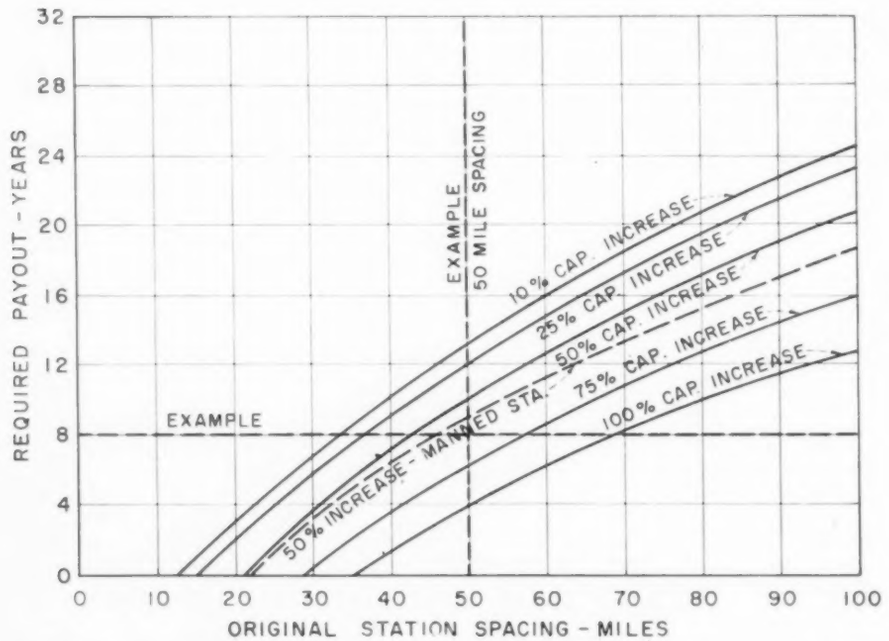


FIGURE 2—Curves compare the loop versus the automatic booster station for an eight-inch line.

By NICHOLAS B. MAVRIS
Continental Pipe Line Company
Ponca City, Okla.

RECENT YEARS have seen a continuing increase in the use of automatic and remotely controlled booster stations. Communications improvement, supervisory equipment development and reliable safety shutdown devices have all combined to permit greater use of this type of station. Undoubtedly use of automatic stations has been adequately justified economically.

This evaluation presents graphic comparisons of the effects of automatic operation of a booster station with a manned operation or with the use of a loop line. Capacity increases on existing systems can be achieved by one of three methods, with automatic operation creating two subdivisions under intermediate booster stations.

1. Intermediate booster stations
   a. Automatic operation
   b. Manned operation
2. Looping with the same size line or larger line
3. Replacement with a larger size line.

Comparisons made here are an attempt to generalize the solutions of the payout of a loop line vs. booster stations, both automatic and manned. They also include a comparison between automatic and manned stations.

It is hoped the solutions will be within the range of actual situations sufficiently so they will serve as a guide to practical problems. While assumptions should be accurate enough to be of value in judging loops vs. boosters, they are not ex-

Loops or Boosters?

This graphical approach simplifies payout calculations for increased capacity of crude or products systems. New automatic control methods may often make boosters a better choice.

About the Author

NICHOLAS B. MAVRIS, assistant to the operations vice-president, Continental Pipe Line Company, has been active in economic design studies related to automation. A graduate of Oklahoma A&M College in mechanical enginering, he joined Interstate Oil Pipe Line Co. in 1949 and was on loan to Interprovincial Pipe Line Company for six months before joining Continental Pipe Line as assistant chief engineer in 1951. Mavris served as chief engineer during construction of the Yellowstone Pipe Line and was later superintendent of that system.

pected to be a means of absolute selection.

Basic Assumptions for Problems. In establishing the problem, several basic assumptions were made. These assumptions will be general and should follow the majority of actual cases.

- **Stations are Equipped with Electric Motor and Centrifugal Pumps.** Increasing use of this type equipment in trunk line stations in recent years led to this assumption.
- **Maximum Station Pressure of 1200 PSI.** While there is some indication that newer lines are using higher pumping pressures, a pressure of 1200 psi is more representative of pressures in use on existing systems.
- **Pump Unit Capacities are Based on 50 Percent and 100 Percent Increase Volume.** For capacity increases between 0 and 50 percent, the pumps selected were assumed to be capable of transporting a maximum volume of 50 percent increase.

  For increases between 50 and 100 percent, the pumps were assumed to be capable of transporting a maximum of 100 percent increased volume. Units would be added in series to reach the maximum pressure and volume required.
- **Intermediate Stations on 24-Hour Operation.** Above the 20 percent increase in volume, it was assumed the intermediate stations would operate full time, but at a reduced pressure. This is in keeping with the assumption that units would be added in series to reach the desired pressure and volume.
- **Existing Communication with Channel Space.** Investment for channelizing equipment is included as well as maintenance costs on communication and supervisory equipment.
- **New Pipe Used for Loop Lines.** While actual situations could in-

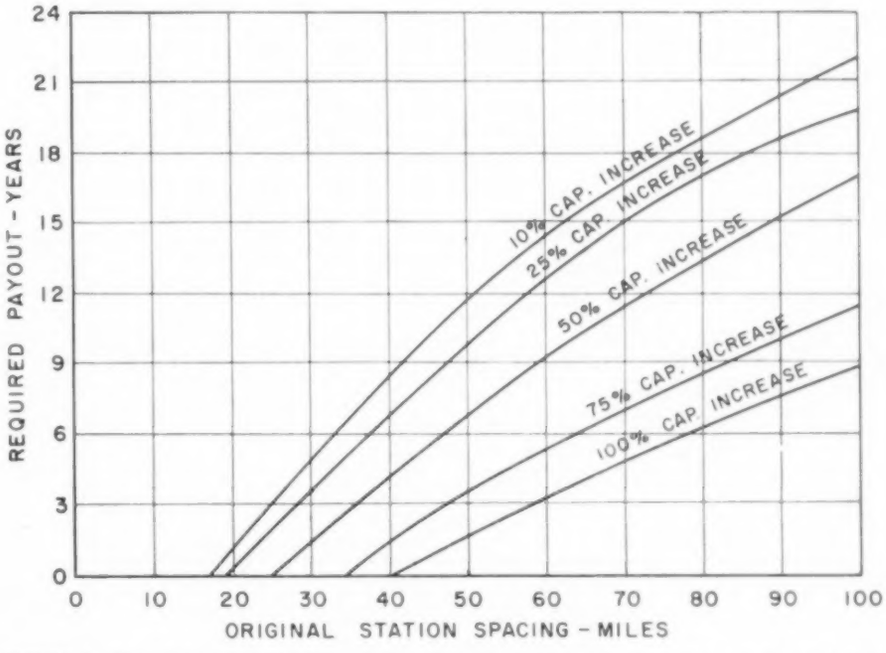


FIGURE 3—Curves compare the loop versus the automatic booster station for a ten-inch line.

volve the use of second-hand pipe or other grades of pipe, it is felt that new pipe is used widely enough to justify this assumption. Prices used were current new mill prices for X-46 pipe.

Payout Compares Alternates. Calculated payout is the generally accepted concept used by the industry in comparing alternates. After it is decided that an enlargement must be accomplished and is justified, this type computation is used to find the best possible means of attaining the enlargement.

This payout is defined as the number of years required for the net savings in operating costs to equal the difference in investment between the two methods being compared. Net savings are figured after income tax and before depreciation. This can be stated in the following form:

$$\text{Payout of Loop over the Booster} = \frac{\text{Inv. Loop} - \text{Inv. Booster}}{(1 - \text{Inc. Tax})(\text{Oper. Cost Boost} - \text{Oper. Cost Loop}) + \text{Inc. Tax}(\text{Depr. Loop} - \text{Depr. Boost})}$$

A similar calculation is used in the comparison of an automatic station with the manned booster station. It should be pointed out that the absolute payout of any one of the three solutions will depend upon the revenue, which, in turn, is related to the tariffs. It must be assumed in each case that economics or some other consideration would be sufficient to justify one of the three methods of solution.

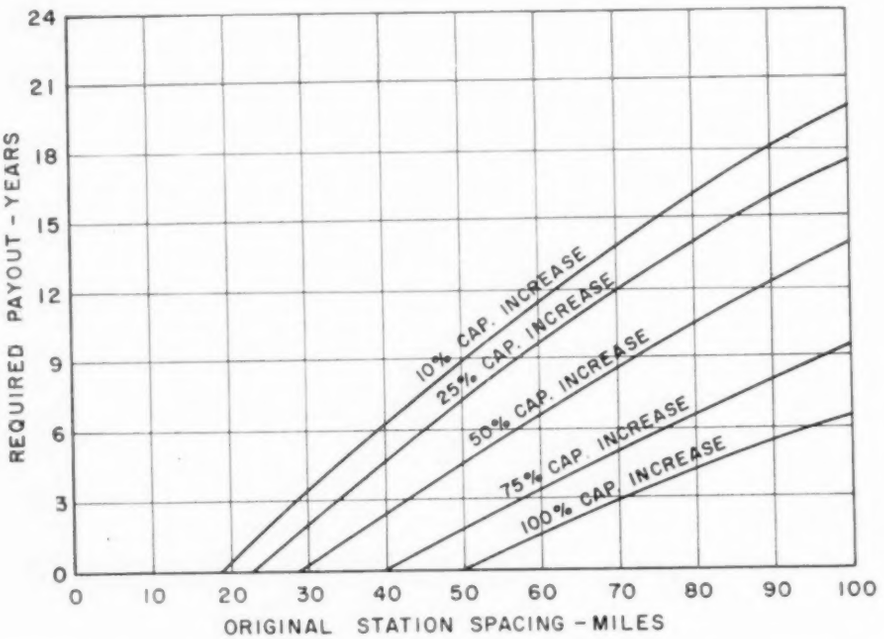


FIGURE 4—Comparison of the loop versus the automatic booster station for a 12-inch line.

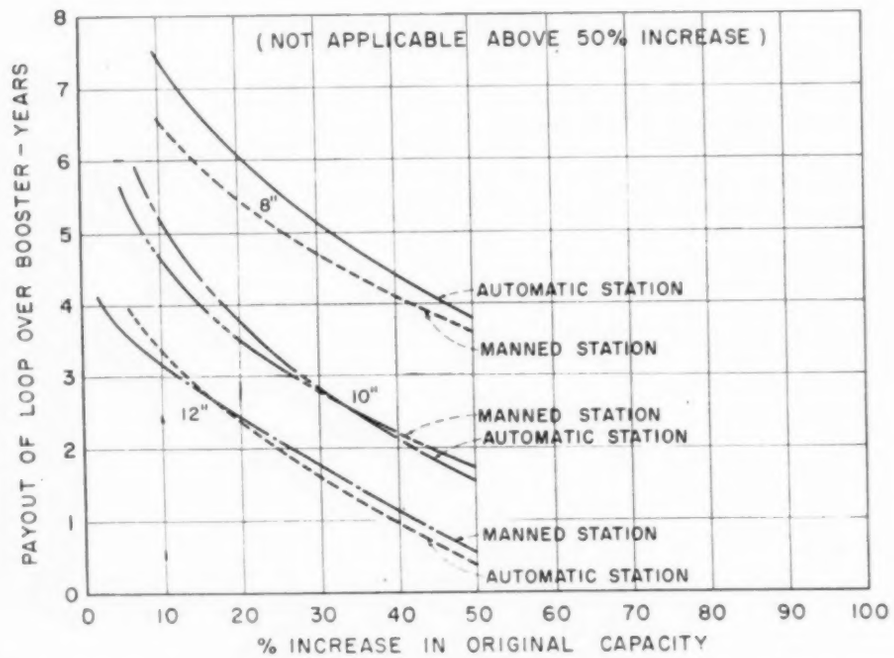


FIGURE 5—Economic study shows the years to payout as against the percentage capacity increase for a 30-mile original station spacing. (70 SSU – 40° API – 1200 psi)

Set Up for Sample Problem. The unit established for study was assumed to be an initial station and a single line system comparing size and distance to the next station. Sizes of line considered were 8-inch, 10-inch, and 12-inch line with loop lines of the same size.

In actual situations, looping with larger lines often occurs because of the desire to enlarge the system considerably above the 100 percent increase in capacity. Equal diameter loops were used because the most economical size of a single length loop is one in which a minimum difference exists in the diameters of the original line and the loop line.

Original station spacings of 30, 50, 75, and 100 miles were picked as the basis for establishing initial conditions. Curves were plotted for these spacings.

Because the original station will require the same volume and pressure for any capacity increase by use of either a loop line or a booster, neither investment nor operating costs at the original station enter into the comparison. Only the additional investment and additional operating cost introduced by the method of securing the capacity increase will be considered in the payout calculations.

Comparing Payouts Graphically. Figure 1 compares use of an automatic station and a manned station. Upon plotting these curves on the

graph showing the payout vs. percentage capacity increase, it was found that the points were grouped sufficiently close that the payout could be said to be a constant of 2.75 years for all sizes of lines and all station spacings. This shows that the use of automatic stations under the assumptions of this article would be justified over the manned station under any condition as long as the 2.75-year payout is acceptable. This is a measurement of the investment required for the automation against the savings in operating cost through the elimination of personnel.

Figures 2, 3, and 4 show a comparison of the loop vs. the automatic booster station for 8-inch, 10-inch, and 12-inch line respectively. These curves give the required payout in years plotted against the original station spacings in miles for varying percentage capacity increases. The smaller the number of years required

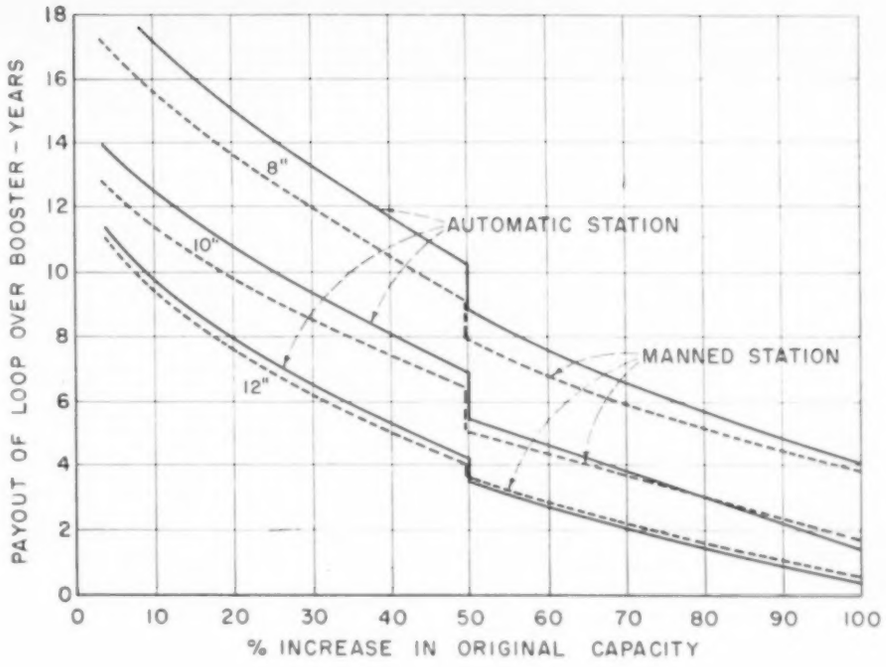


FIGURE 6—Years payout plotted against the percentage capacity increase for a 50-mile station spacing. (70 SSU – 40° API – 1200 psi)

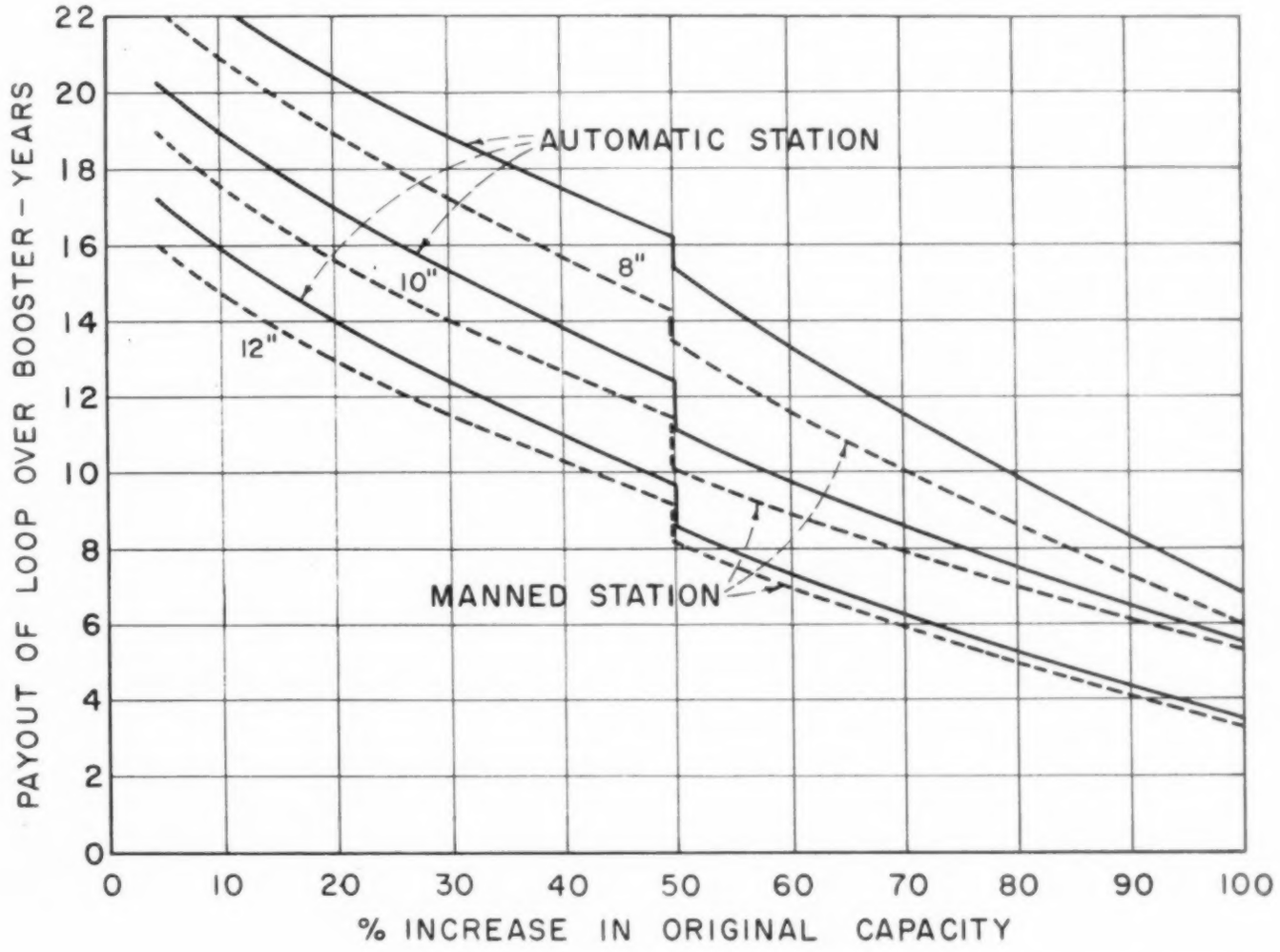


FIGURE 7—Curves show the years to payout as against the percentage capacity increase for a 75-mile station spacing. (70 SSU – 40° API – 1200 psi)

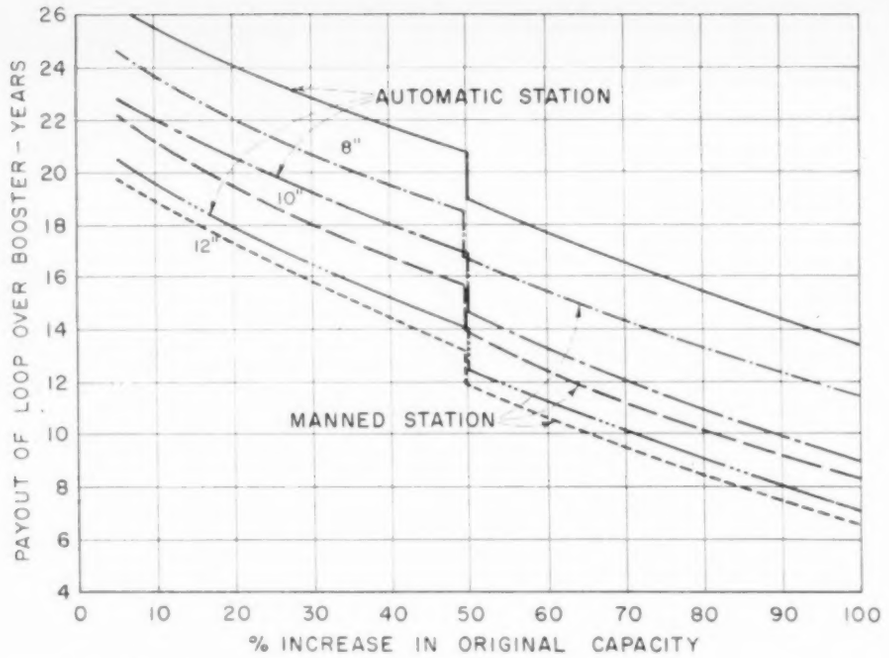


FIGURE 8—Economic study shows the years to payout as against the percentage capacity increase for a 100-mile station spacing. (70 SSU – 40° API – 1200 psi)

for the payout the more the loop will be favored; if, for example, 8 years is the required payout and the original station spacing is 50 miles, then for a 50 percent capacity increase an automatic booster station would be favored. For any increase above approximately 60 percent, the loop would be favored. Volume increases above 50 percent require two stations, which tends to favor looping the line.

Comparison of the three curves—Figures 2, 3, and 4—indicates an increase in years to pay out for any given percentage capacity increase with decreasing line size. This would indicate a degree of correlation favoring the use of the booster station as the line size decreases. This possibility would have to be investigated for many other sizes of lines for confirmation.

Payout curve of a loop over a manned station for an 8-inch line at a 50 percent volume increase is shown

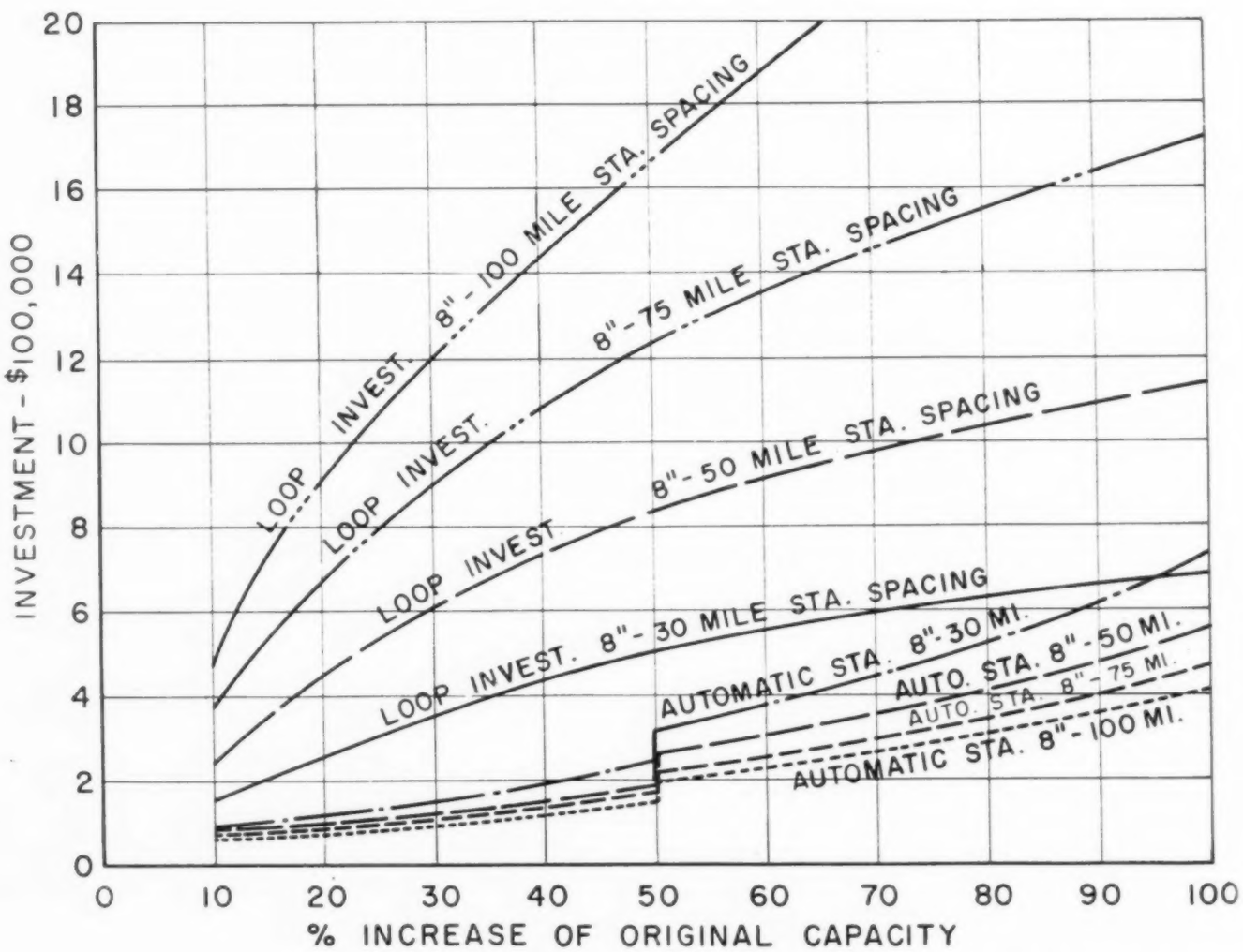

INVESTMENT - $100,000
% INCREASE OF ORIGINAL CAPACITY
LOOP INVEST. 8" - 100 MILE STA. SPACING
8" - 75 MILE STA. SPACING
LOOP INVEST.
8" - 50 MILE STA. SPACING
LOOP INVEST.
LOOP INVEST. 8" - 30 MILE STA. SPACING
AUTOMATIC STA. 8" - 30 MI.
AUTO. STA. 8" - 50 MI.
AUTO. STA. 8" - 75 MI.
AUTOMATIC STA. 8" - 100 MI.

FIGURE 9—Comparing investments used for eight-inch loops and automatic stations for various original station spacings.

on Figure 2. This curve indicates the decrease in station spacing in miles that can occur for the same payout. Noting again the example of 8 years as the required payout, station spacing for the manned station is shown to be 46 miles; while for the loop vs. the automatic station, it is 43 miles. This gives some indication that optimum station spacings will decrease with the use of automatic stations.

Payout Compared With Capacity Increase. Figures 5 through 8 show the same data plotted in a different manner. These curves show the years to pay out as against the percentage capacity increase for the various size lines. These are plotted on curves indicating the 30, 50, 75, and 100-mile station spacings. Two curves are shown for each size line. One curve represents the loop vs. the manned station; the other curve, the loop vs. the automatic station. Discontinuity in the curve at 50 percent capacity increase indicates the point above which two stations will be required.

An interesting point to note is the change in relative positions of the manned and automatic curves and the very low payout figures. As stated before, the automatic station should pay out over the manned station in approximately 2.75 years. Two curves plotted for each size line change their relative position at about the 2.75-year point; that is to say, above this point the automatic booster station curve is always above the manned station curve while the reverse is true below this point. This would have practical significance in case, if, for some reason, the loop could not be built to achieve the high increase in capacity. The manned station would then be built only if the 2.75-year payout was unacceptable for the additional investment required for automatic operation.

If the capacity increase is expected to be above 50 percent, then the loop line would be favored in almost all cases, except for the longer station spacing. That is somewhere above 70 miles. For increases up to 50 percent, the loop will be favored for spacing below approximately 70 miles, while the booster is generally favored above the 70-mile station spacing.

From a practical standpoint, if a second capacity increase is to be experienced that would cause it to go from below 50 percent to above 50 percent, then it would be easier to economically justify handling this second increase if the loop had been chosen initially. If the booster station had been built, this would have the effect of switching the situation to a second curve of one-half the station spacing of the original situation.

Summary of Investment Costs

Loop Lines—Investment costs of

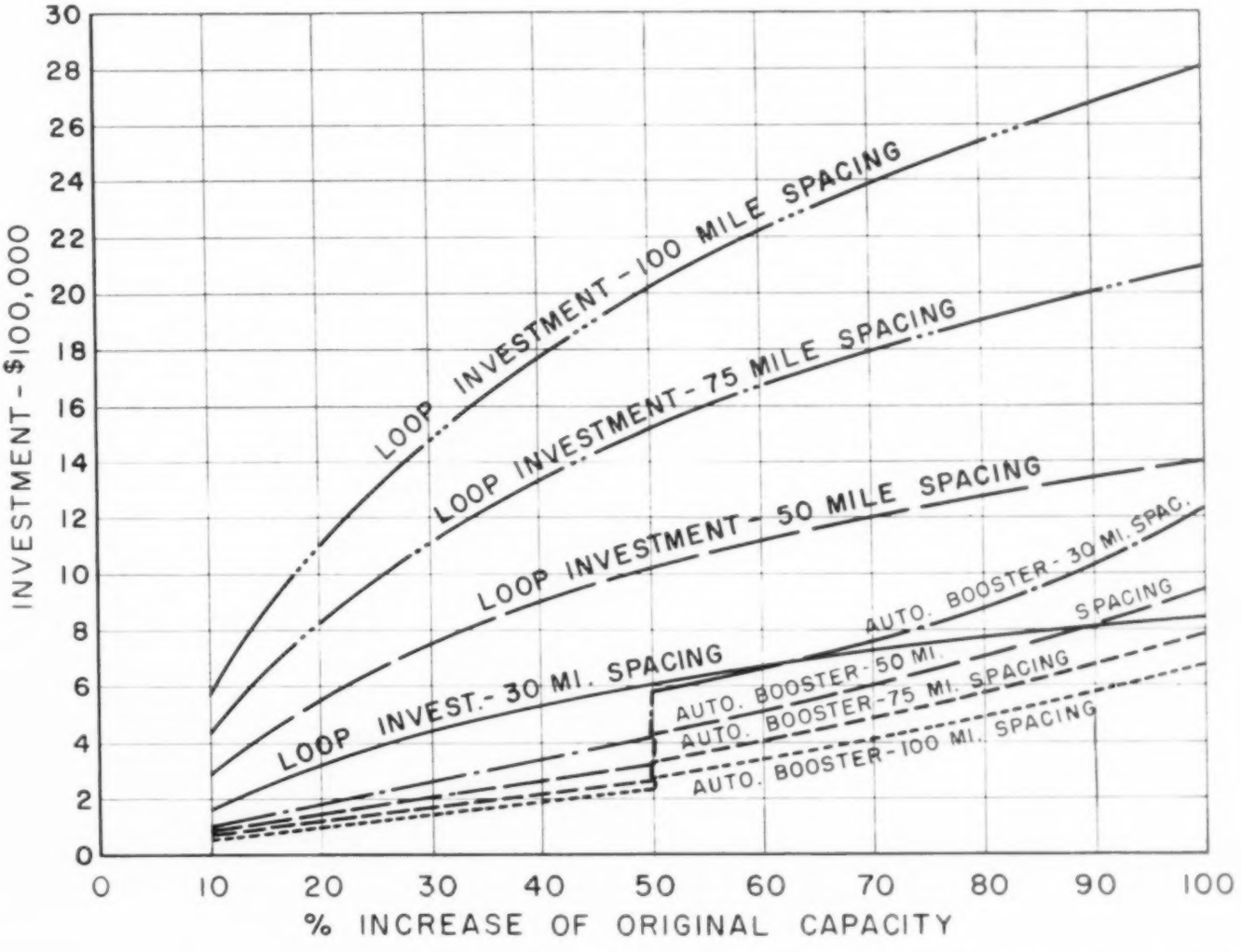

INVESTMENT - $100,000
% INCREASE OF ORIGINAL CAPACITY
LOOP INVESTMENT - 100 MILE SPACING
LOOP INVESTMENT - 75 MILE SPACING
LOOP INVESTMENT - 50 MILE SPACING
LOOP INVEST. - 30 MI. SPACING
AUTO. BOOSTER - 30 MI. SPAC. SPACING
AUTO. BOOSTER - 50 MI. SPACING
AUTO. BOOSTER - 75 MI. SPACING
AUTO. BOOSTER - 100 MI. SPACING

FIGURE 10—Curves compare the investments used for ten-inch loops and automatic stations for various original station spacings.

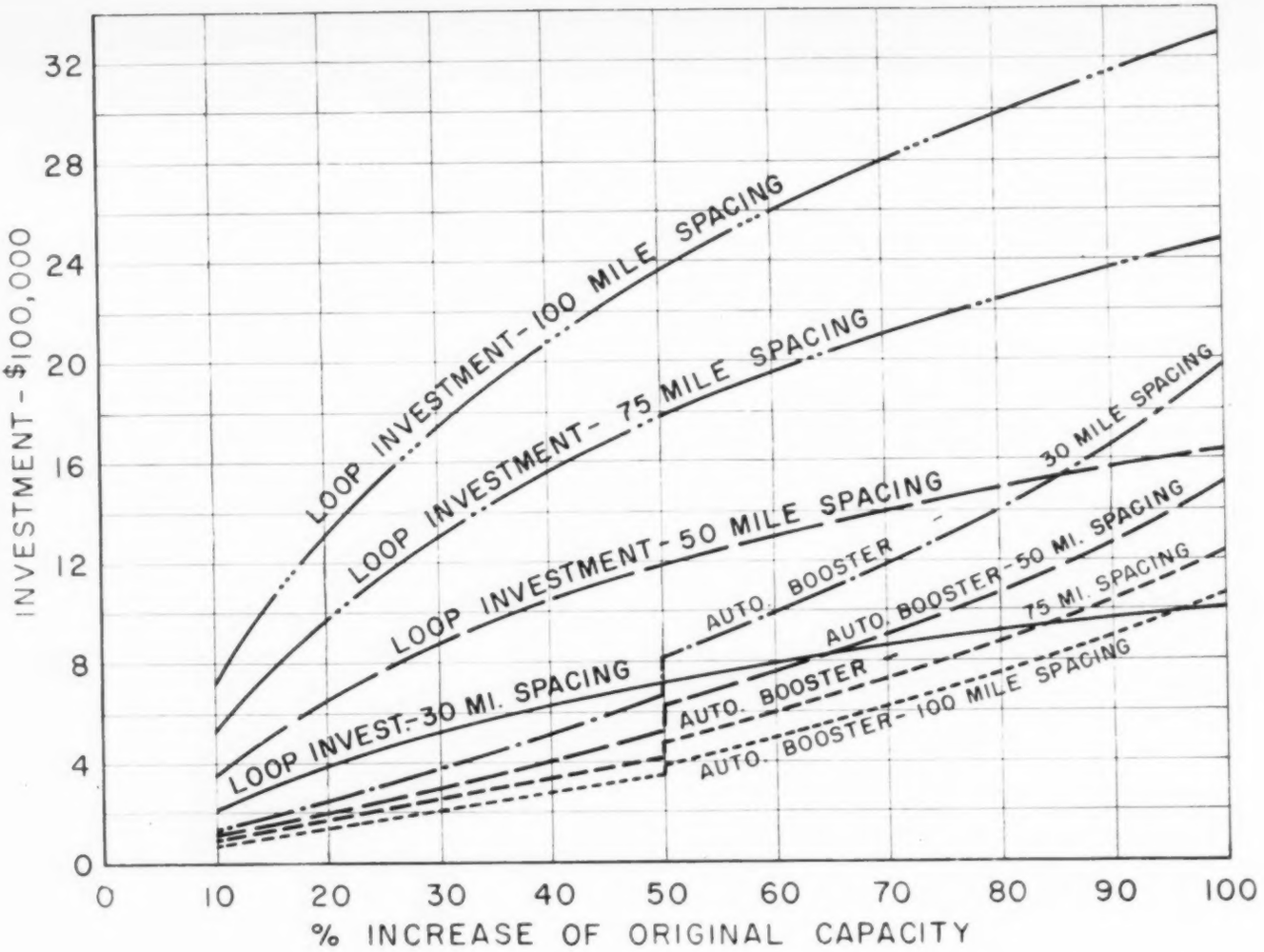


FIGURE 11—Investments used for 12-inch loops compared with automatic stations for various original station spacings.

the loop lines for the various sizes were as follows:

8-inch = $23,000/mile
10-inch = $28,000/mile
12-inch = $33,000/mile

This is based on normal cross-country construction without extraordinarily high construction costs on river crossings.

Station Construction—Cost estimates were predicated on outside units with concrete block switchgear and supervisory equipment building. Costs were assumed as follows:

8-inch = $20,000 + $150/HP
10-inch = $23,000 + $150/HP
12-inch = $27,000 + $150/HP

Supervisory and Telemetering—A single channel was required for the supervisory equipment and costs were varied to accommodate the number of pumps units required.

Ten protective and alarm functions were established for the supervisory equipment. They were for each unit:

1. Discharge valve operation
2. Suction valve operation
3. Start and stop main unit
4. High station discharge pressure
5. Low suction shutdown
6. Seal failure
7. Bearing Failure (pump and motor)
8. High pump case temperature
9. Channel failure (1 per station)
10. High sump alarm (1 per station)

The following values were required to be telemetered from the booster station:

1. Suction pressure
2. Discharge pressure
3. Station case pressure.

Thus, four channels were required for each intermediate station.

Investment costs were used as follows:

Supervisory

$7500 + $230/point + $3000 for channel

or

1-unit station = $12,800
2-unit station = $14,640
3-unit station = $16,480
4-unit station = $18,320

Telemetering

$2,000/function + $3,000/channel

or

$15,000/station

Investment Curves

Figures 9, 10, and 11 show the investments used for the loop line and for the automatic booster station. In each case, in the interest of clarity, investment curves for the manned station were omitted. They can, however, be derived from material given in the report.

ACKNOWLEDGMENT

Presented at the Annual Pipe Line Conference of the API Division of Transportation, Cleveland, May 5-8, 1957, under the title "Effects of Automation - - - Loops vs. Boosters."

Unattended Pipe Line Deliveries Work

Standard Oil Company (Indiana) developed unattended pipe line deliveries in their search for new savings. Its design and operation proved successful but economic studies hold the key to future installations.

By W. D. LOMAX and H. W. WILKER
Standard Oil Company (Indiana)
Chicago

IN THE SEARCH for new savings in their pattern of operations, Standard Oil Co. (Indiana) has equipped its Colon, Michigan, bulk plant with automatic facilities to allow unattended delivery of pipe line stock direct to plant tankage. Normally, product deliveries to a bulk plant are made by truck or rail shipment, and require the agent's presence during receipt. This system conserves the agent's time for more profitable duties and eliminates lost time caused by adverse weather or plant operating conditions.

In consolidation of plants, or in revision of obsolete plants, the possibility for use of this type delivery is always open. Advantages and disadvantages must be carefully weighed.

Advantages over truck or rail deliveries:

- Reduction of paper work in the preparation and processing of stock orders and follow-up correspondence.
- Savings in the number of barrel-miles hauled where stock is backshipped from line terminals.
- Less vapor losses where stock enters terminal storage before shipment to the bulk plant.
- There can be a decremental reduction in terminal tankage.
- Manpower hours required to load and unload trucks or tank cars are eliminated.
- Demurrage charges on tank cars are eliminated.
- Savings accrue through expansion of the agent's territory and increased sales.
- Deliveries are not sensitive to weather and road conditions.

Unattended pipe line deliveries also have disadvantages. Those most apparent are:

- Investment for control devices is relatively high.
- Control devices increase pipe line maintenance costs.
- There is an incremental increase in the dispatcher's work.
- Investment costs are often high on laterals to the main line.

Typical Bulk Plant Chosen. The plant at Colon, Michigan, was selected for the installation of control devices remotely started from the Chicago office. It was thought that this plant was a representative one, and it was within reasonable distance of a main line. During construction

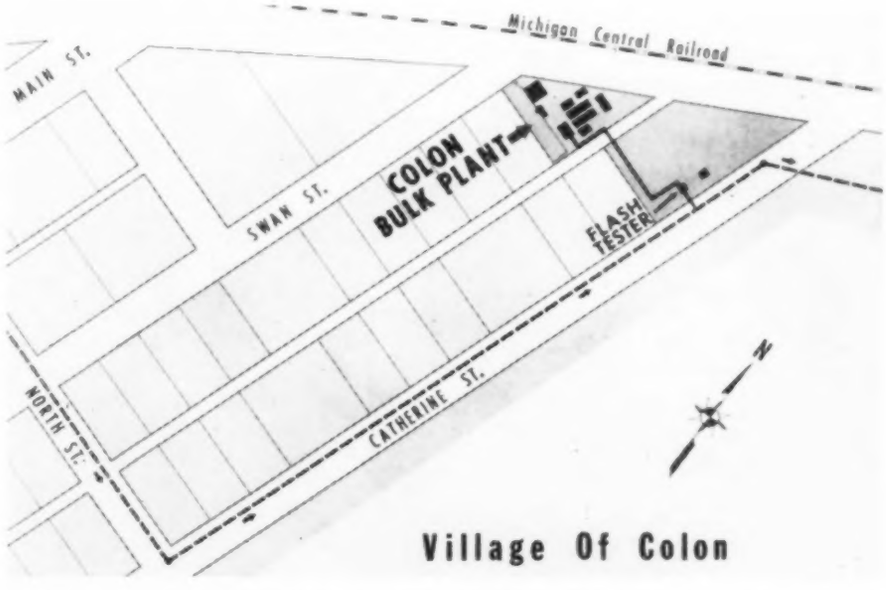


FIGURE 1—Original location of the pipe line used street right-of-way. For pipe line delivery facilities to be installed, the line would have to be re-routed, or laterals laid between the plant and the line.

in 1953 the 10-inch main line was routed through the Village of Colon, utilizing street right-of-way. This routing later made it necessary for the line to either be rerouted across the plant site or laterals be installed to the plant. (Figure 1)

It was decided to tap the main line in the street and lay two laterals. Again, consideration was given to this, being typical of connections which might be expected at bulk plants. It necessarily complicated the design.

Design Requirements Apparent. The primary differences between unattended pipe line deliveries to bulk plants and terminals were soon recognized.

- Once the product was delivered to the bulk plant, it was beyond the point of detailed testing. This is of particular importance in the handling of heating oils.
- Since the delivery was made to a commission agent, the delivery should not increase his labors, but rather reduce them.
- Delivery from the main line, flowing at pressures as high as 1000 psi, to the extremely small tankage should be made at a slow rate.
- The flow should be accurately metered and recorded.
- There could be no outage to sumps or spill tanks.
- Due to the location of the plant the operation must be extremely safe and reliable.

Piping Arrangement Eliminates Contamination. Small diameter pipe was purposely used in the laterals to expend as much main line pressure as possible before reaching the meters. The pipe arrangement for the oil lateral is shown in Figure 2. Product enters the lateral through a main line tap at valve "A." This valve is below grade and maintained in a normally open position. Valves "B" and "C" are an electrically operated solenoid and a motorized gate valve, respectively. These valves cannot be opened until the stock intended for delivery has passed through the flash tester and checked satisfactorily for delivery.

The dormant stock lying between the solenoid valve and the main line could contain a mixture of gasoline and oil; therefore, a purge pump is used to displace this stock to the main line. Both the purge pump and flash tester are placed in operation upon receipt of a remote code signal initiated by the pipe line dispatcher. When the product tests satisfactorily for delivery, the flash tester initiates a signal to open both "B" and "C".

The flow of product to tankage is not established until valve "E" is placed in the operating position. This valve is a diaphragm operated globe valve controlled through a solenoid pilot. Valve "D" is a back pressure regulating valve. With valves "B" and "C" open and valve "E" closed, valve "D" senses an increase in pressure and moves to the closed position. This affords a high degree of meter protection when valve "E" is opened. Upon receipt of a second remote code signal, valve "E" opens, establishing flow through the meters.

This plant was sized to receive at a rate of 140 gallons per minute. Flow of product is limited by a flow controller placed immediately downstream from the meter. Restriction by the flow controller increases the pressure on the diaphragm of the regulating valve "D", thereby restricting flow to the desired quantity.

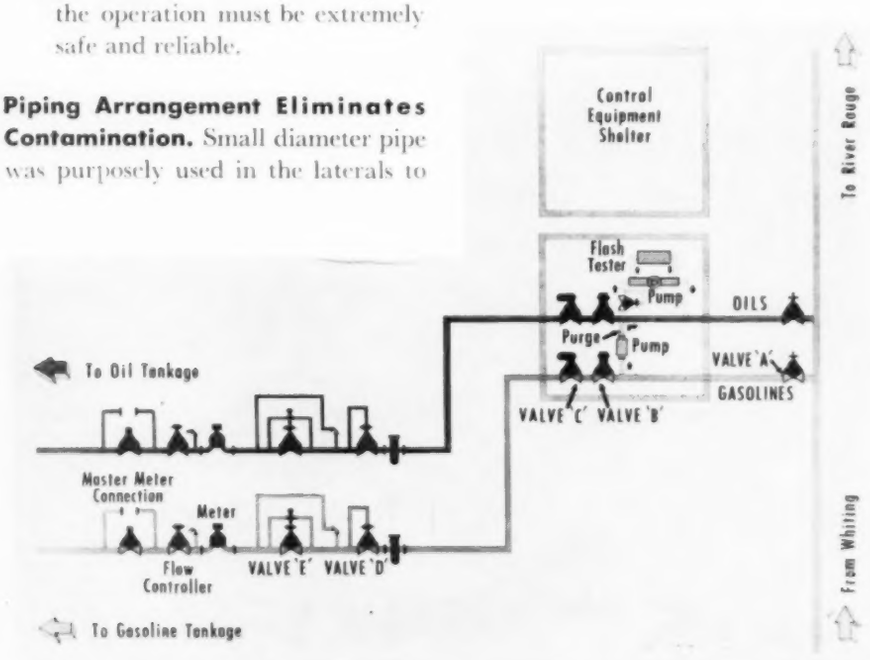


FIGURE 2—Schematic showing the unattended pipe line delivery facilities to the Colon, Mich., bulk plant.

Metering Equipment Controls Delivery Rate. The metering equipment in this installation consists of:

- Meter
- Meter switch
- Set stop
- Totalizer
- Ticket printer
- Flow rate controller.

It should be noted that a set stop valve was not used. The set stop mechanism is used to pre-set the quantity of the desired delivery and to mechanically actuate the meter switch upon completion of the delivery.

Meter proving is accomplished by connecting a portable master meter in series with the plant meter. The master meter is calibrated and tested at a main line terminal against a fifteen barrel proving tank either in oil or gasoline, dependent on its intended use at Colon.

The establishment of safe and reliable control of the operating devices at this plant necessitated a number of control circuits. Considerable thought was given to these devices and to their functions, and it was concluded that it would be necessary to safeguard against:

- Minimum flash of oils off specification
- Power failure
- Excessive meter pressure
- Tank overflow
- False control signals

The operating devices incorporated in this design can be controlled by remote, local or emergency signals. The success of the system depends upon these operating devices and their reliability.

Special Flash Tester One of Principal Controls. Importance of the

flash tester should not be minimized. Its function is to test all product entering the plant through the oil lateral. It was recognized that flash testers used for other applications would not be suitable at this location; therefore, a new instrument of special design was required.

The instrument used was engineered and assembled by Standard's Engineering Research Department at Whiting, Indiana. It is basically a "go or no go" instrument. The instrument can be set for a specific flash point. Below that point, product is flashed and the plant is isolated from the main line. Above that point, the product is recognized as oil and admitted to the plant. The great dependency placed on this instrument necessitated that it be self-checking; spark ignition, fuel-air ratio, product flow, and product temperature are properly checked.

In this installation the elapsed time from the moment the test sample is drawn until the sample is actually tested is very critical. To minimize this elapsed time, very short runs of extremely small tubing were used. One of the more difficult tasks was in providing the flash tester with an appropriate sample prior to the establishment of flow in the oil lateral. This was accomplished by installing a purge pump. It was necessary that this pump operate with high static pressures and practically no differential head. Several different pumps and piping arrangements were tried before a satisfactory one was found.

Samples are supplied by an injection type pump which delivers constant volume to the tester. Through a separate cylinder the injection pump returns drainage from the flash instrument to the line. This piping arrangement was used to eliminate the need for a sump.

Power Failure Isolates Plant. Experience in the operation of electrically powered devices has indicated good reliability; however, there have been power outages where neither motorized valves or communications would function. A power outage at this location could not be tolerated. Since it could not be controlled, attention was directed to controlling the effects which would result from a power outage. For that reason installation was made of solenoid and solenoid pilot-operated valves which would automatically close if a power failure should occur.

Under normal conditions with power available, the plant delivery is terminated by the set stop mechanically activating the meter switch. The motorized gate closes and upon reaching a closed limit, de-energizes the solenoid valves resulting in their immediate closure.

Tank level switches were used to prevent the overfilling of any tank. These switches are electrically connected in series in the shutdown circuit with a high meter pressure mercoid, the flash tester fault switch and an emergency station stop switch. Activation of any switch in the shutdown circuit causes the solenoid valves to close, followed by a closure of the motorized gate valve.

False remote signals are prevented through the use of an access code which must be actuated before a function code can be operated.

Plant Operation Simplified. In actual operation the plant agent gages his tanks and computes the desired delivery. This information is transmitted to the pipe line dispatcher who determines the availability of stock. After the agent is advised that his request for delivery has been approved, he (1) aligns the proper tank valves, (2) sets the delivery quantity on the meter set stop and (3) inserts a ticket in the ticket printer. No further action nor the presence of the agent is required during the stock delivery.

Dispatcher Makes Cut by Signal. The pipe line dispatcher determines, by calculated line fill, when the heart-cut delivery is available. He then initiates a code signal to gain access to the plant control devices. This signal is followed by a second signal which starts both the purge pump and the flash tester in operation. Within a specific period of elapsed time he must initiate a third code signal to open the solenoid piloted valve. With the opening of this valve, delivery begins. The dispatcher can monitor the position of the motorized gate valve at any time. When delivery is complete the set stop opens the meter switch. The meter switch initiates action to isolate the delivery facilities from the main line.

The plant agent removes the ticket from the ticket printer at his convenience and prior to subsequent deliveries. This ticket is mailed to the accounting office and used for billing purposes.

ACKNOWLEDGMENT

From a paper prepared for presentation at Annual Pipe Line Conference, API Division of Transportation, Hotel Cleveland, Cleveland, Ohio, May 8, 1957.

About the Authors

Lomax

Wilker

W. D. LOMAX is senior head engineer for the Civil, Hydraulics and Electrical Sections of the Supply and Transportation, Operations-Engineering department at Standard. Since joining the company in 1947, Lomax has been associated with the construction of such projects as Whiskey Creek Station, Utah's Burley terminal and the Whiting-River Rouge pipe line. He was with the Illinois Highway Department and the Pennsylvania Railroad before working with Standard. Lomax holds a B.S. in civil engineering from the University of Illinois.

H. W. WILKER, district superintendent of the Jackson district, has been with Standard Oil Co. (Indiana) since 1939. He entered the pipe line business three years earlier with Stanolind Pipe Line Company, joining Standard when its first products line was constructed. Wilker has served Standard's Products Pipe Line department as dispatcher, maintenance foreman, assistant to the general superintendent and supervisor of scheduling and dispatching. In his present job he has worked closely with the construction and operation of unattended pipe line deliveries to Standard's bulk plant at Colon, Mich.

What You Can Expect from Today's

High capacity units measure rates up to 10,000 bph accurately. Performance records of present meters show that 20 million barrels can be measured before meters need overhaul.

By D. C. McKINLEY
Interstate Oil Pipe Line Co.
Shreveport, La.

POSITIVE DISPLACEMENT meters having maximum capacities in excess of 2860 barrels per hours have gone a long way in meeting the need for accurate inline measurement at high rates of flow. Meters based upon other principles, such as the turbine units, are also being developed and tested by several manufacturers. They may become competitive in the near future.

PD meters with capacities above 2800 barrels per hour have been considered as high capacity unit. Actually there are only two high capacity PD meter ranges available today; the 2800 bph range and the 10,000 bph. In the lower range, three manufacturers list meters as commercially available. One meter has been tested and is listed as commercially available in the higher ranges; another is in final stages of development and initial testing.

Future pipe line industry demands for high rate, in-line measurements (4000 to 10,000 bph in lines and up to 40,000 bph at terminals) will probably support the development of other high capacity meters. At present, the most likely ranges needed seem to be in the 5000 bph and 20,000 bph areas.

There is keen interest in the accuracy, reliability, maintenance and first cost of high capacity DP meters. In this study, details of design are purposely neglected. Those interested in the fine points may prefer to obtain specific information from individual manufacturers.

Although meters are generally grouped in a capacity classification, some users operate slightly about the manufacturers' rating. Others may for various reasons operate under the rat-

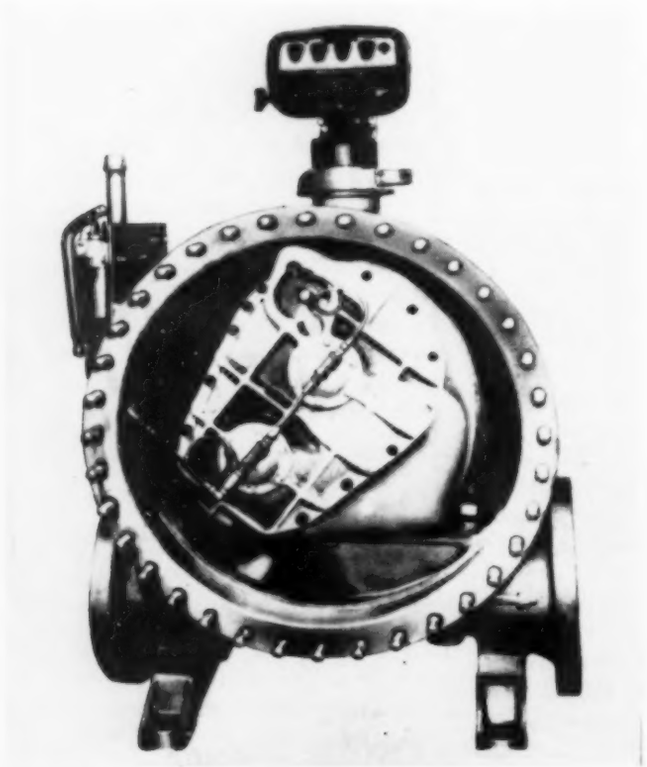


FIGURE 1—Open view of double-case meter using the helical bi-rotor principle of positive displacement. Operation is a continuous rotating motion with no reversing action.

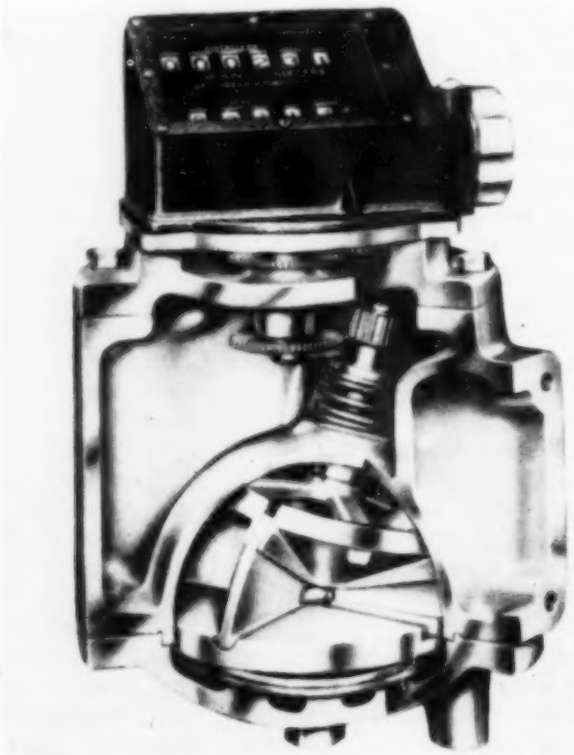


FIGURE 2—Internal view of single case meter using the rotary principle of positive displacement. It features continuous motion and self-lubrication.

PD Meters

FIGURE 3—Inner case of meter shown in Figure 4. Principle of operation depends upon reversing action for each revolution. Meter has smooth continuous flow characteristics with low head loss.

ing, but these groupings are considered representative.

Three types of meters are now available in the 2800 bhp capacity, 150 pounds per square inch class which will be described.

In Table 1, meters in 2800-bph class have been listed by type, approximate industry price and capacity rating. Since most manufacturers consider it sound practice to overload their meters intermittently for short periods of time, the table includes the capacities at 10 percent above manufacturers' continuous operating ratings.

TABLE 1

Meter Type	Approximate Price	RATINGS BPH	
		Manufacturer's Continuous	Operating 10% Over
A	$3000	3000	3300
B	2025	2860	3150
C	3011	2860	3150

Approximate prices shown in Table 1 are based on list prices of the 150 psi class. Pressure ratings up to 1000 psi are available at higher prices; these are comparable among the various types of meters. Prices in the tabulation represent the cost of the 150 psi meters with only indicating registers. Cost of temperature compensation, printers and other auxiliary items would raise prices slightly. For comparative purposes, this tabulation should be adequate.

Double Case, Helical Bi-Rotor Meter. Type *A*, shown in Figure 1, is a double meter using the helical bi-rotors principle of positive displacement. It features a continuous rotating motion with no reversing action. It has a steel case equipped with 8-inch flanges; face to face dimension is 32 inches. Its estimated weight is

FIGURE 4—Double case meter using the rotary vane principle of PD measurement installed in pipe line service. This meter utilizes a cam controlled vane type rotating element carried on self-lubricated bearings.

FIGURE 5—Installed view of double case rotary vane meter in 10,000 pbh class. An enlarged version of the meter shown in Figure 3 with six blades instead of four. It weighs about 5,800 pounds.

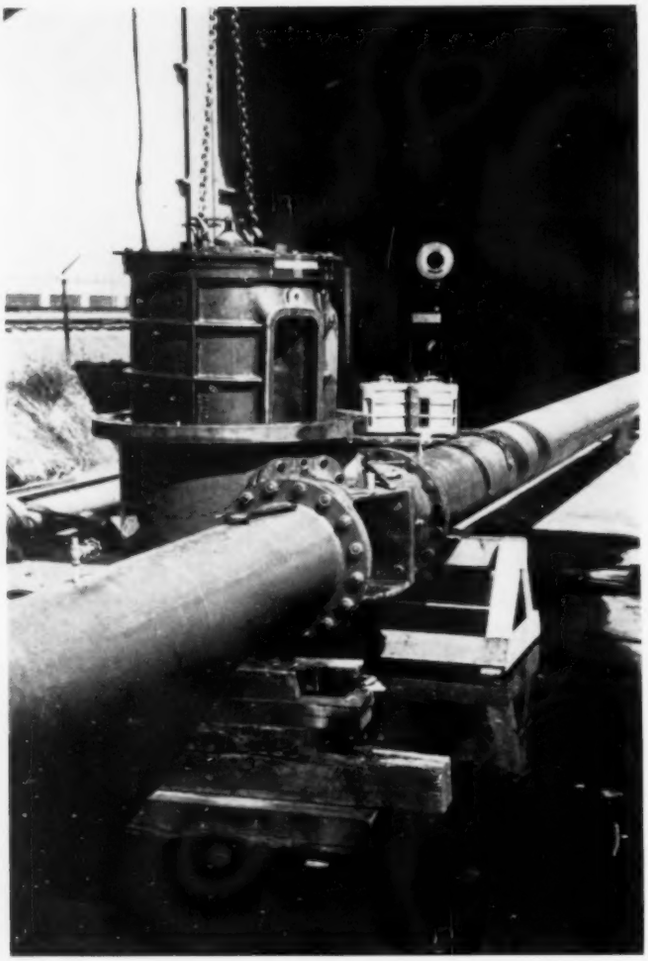


FIGURE 6—Inner case of high capacity double case rotary vane meter being removed for inspection. Meters of this type have been under field test for six months measuring over 30 million barrels of crude.

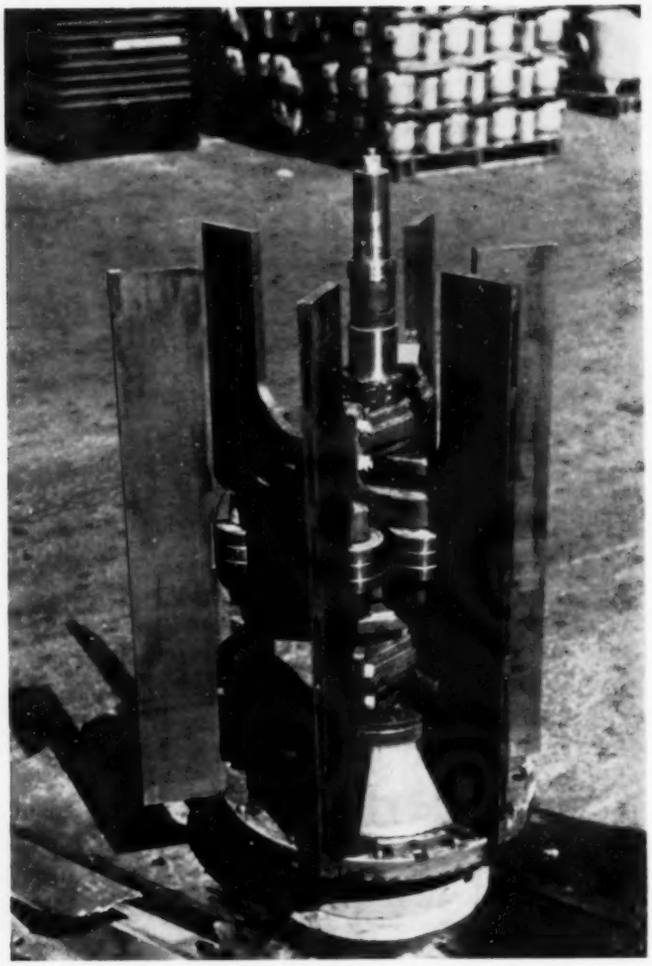


FIGURE 7—Blade assembly unit of high capacity meter shown in Figure 6. Inspection after 15 million barrels of crude oil were measured, revealed that clearances were essentially the same as originally set.

850 pounds. This type meter was originally designed as self-lubricating but can be supplied with sealed bearings running in oil; its lubricating system was later modified to increase the rating.

Single Case-Rotary Type. Meter *B* (Figure 2) is a single case meter using the rotary principle of positive displacement. It also features continuous motion and is self-lubricating. The steel case, equipped with 8-inch flanges, has a face to face dimension of 35 inches and over-all height of approximately 30 inches; estimated weight is 1,200 pounds.

Double-Case Rotary Vane. Type *C*, (Figures 3 and 4) is a double case meter using the rotary vane principle of positive displacement. It uses a cam controlled vane-type rotating element which is carried on self-lubricated bearings. The principle of operation requires reversing action for each revolution but permits smooth continuous flow characteristics with low head loss across the meter. It has a 24-inch steel case with 10-inch flanges, face to face dimension is approximately 31 inches, and over-all height is approximately 48 inches. Estimated weight is 2000 pounds.

Meters in the 2800-bph capacity range have been in operation for approximately four years. Accurate, reliable and economical performance has brought favorable acceptance in both product and crude oil service. Experience indicates a service life in the range of 20 million barrels throughput can be anticipated. Use of this high capacity meter has necessitated some changes in meter operation and calibration practices.

10,000 BPH Meters. At present, there are only two types of PD meters developed in the 10,000 bph capacity range. One has been delivered and tested; the other is under test. Important features of these meters are shown in Figures 5 through 7. Table 2 compares the two types in this range. To date, they have been manufactured only in the 150-psi pressure class.

TABLE 2

PD Meters—10,000 BPH—150 PSI Class

Meter Type	Approximate Price	RATINGS BPH	
		Manufacturer Continuous	Operating 10% Over
D	$14,000	10,000	11,000
E	24,000	10,000	11,000

Although these meters have not as

New and More Valuable Rule-of-Thumb Notebook

Future issues of PIPE LINE INDUSTRY will carry more detailed engineering data sheets in addition to the time-saving Rules of Thumb. This expanded feature will include graphs, charts, data tables and nomograms selected to help you solve engineering, design, construction and operating problems. For each acceptable illustrated one-page contribution, PIPE LINE INDUSTRY will pay $25. Send us your favorite. Rules of Thumb are still being accepted at regular payment of $15 each. (See Page 57 for this month's Rule of Thumb feature.)

yet been used in actual operations, completed tests on Meter *E* under simulated operating conditions definitely indicate it to be satisfactory for industry use.

Prices are approximate for the 150-psi class meters with indicating registers only; auxiliary equipment is available if desired.

8 Element Rotocycle Unit. Type *D* is an eight element meter based on the rotorcycle principle. Individual elements are mounted on a common chamber in a manner such that they operate in parallel allowing the measured stream to divide equally between them. Throughput of each is indicated at the element and fed into a combined figure for the total. Design is such that the meter factor will be a combined factor for all the units.

Construction permits any element to be inspected individually providing the meter is out of service. It is equipped with 16-inch flanges with a face to face dimension of 104 inches; over-all height is approximately 50 inches and width is 62 inches. Estimated weight is 7100 pounds.

Double Case Rotary Vane. The double case meter (Type *E*) uses the rotary vane principle. It is essentially an enlarged version of the Type *C* meter except it has six blades instead of four.

A 36-inch steel outer case is equipped with 16-inch flanges; face-to-face dimensions is 46 inches; over-all height is 65 inches. The meter weighs approximately 5800 pounds.

30 Million Barrels Measured. This meter has been under field test for approximately six months and has measured over 30 million barrels of crude oil at rates near its maximum rating. An inspection made at 15 million barrels revealed that clearances were essentially the same as originally set. The meter was reassembled after inspection with the same parts and placed back on stream. Strainer protection for this meter is shop-made from steel plate with ¼-inch diameter holes.

Accuracy Encouraging. The performance of high capacity meters in general has been gratifying. Accuracy curves plotted from available field tests confirm that manufacturers' designs are sound. Sufficient field data to assure acceptable accuracy have been collected on the 2800 bph class meters in both crude oil and product service.

Data on the 10,000-bph class is limited to one meter measuring two grades of crude oil. Performance of each type meter is portrayed in characteristic curves.

Accuracy curves have been plotted in terms of meter factor versus flow rates on a scale purposely enlarged to aid in portraying the meter performance. All performance curves for each class meter are plotted on the same scale for easier visual comparisons.

About the Author

D. C. McKINLEY, senior oil measurements engineer for Interstate Oil Pipe Line Company for the past five years, has been active in the introduction and adaptation of PD meters to crude oil service. His initial measurement experience was obtained as meter foreman for a products pipe line company in 1941. Following graduation from Oklahoma University with a degree in mechanical engineering he was employed as a petroleum engineer in Venezuela for two years. After three and one-half years with the U. S. Army Corps of Engineers, McKinley joined Interstate as a district engineer in 1946. Currently he is representing Interstate on API and other industry committees concerned with pipe line measurement.

Head loss curves are plotted in loss psi versus flow rates and are also on the same scale for all meters in the

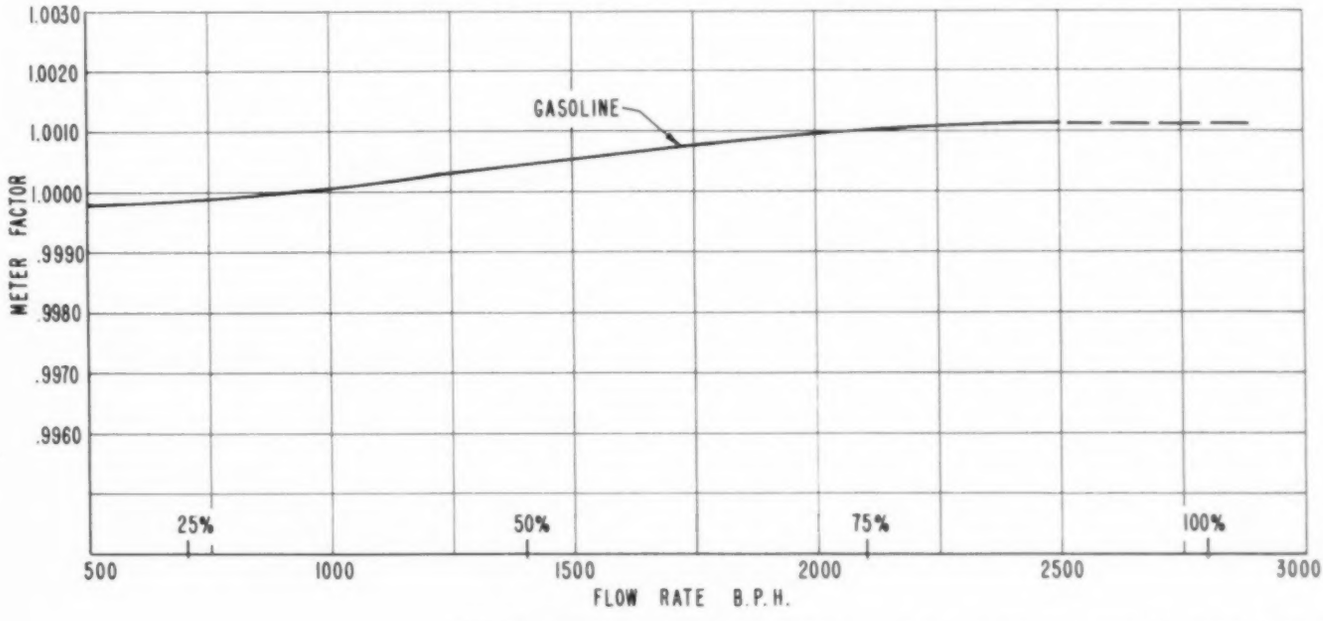


FIGURE 8—Comparison of meter factor with flow rate for single-case PD meter based on manufacturer's data.

same classifications for comparative purposes. Fluid characteristics or identification is indicated for each curve.

From these performance charts it is logical to believe that the accuracy performance for high capacity meters may be expected to be more desirable than performance of smaller meters. Viscosity effect of crude oil tends to smooth out the performance and increase the head loss as is to be expected.

High Capacity Operation Similar. Operation of high capacity meters is very much the same as for the smaller meters. Larger piping and valves required are compatible with increased flow rates and are not a serious handi-

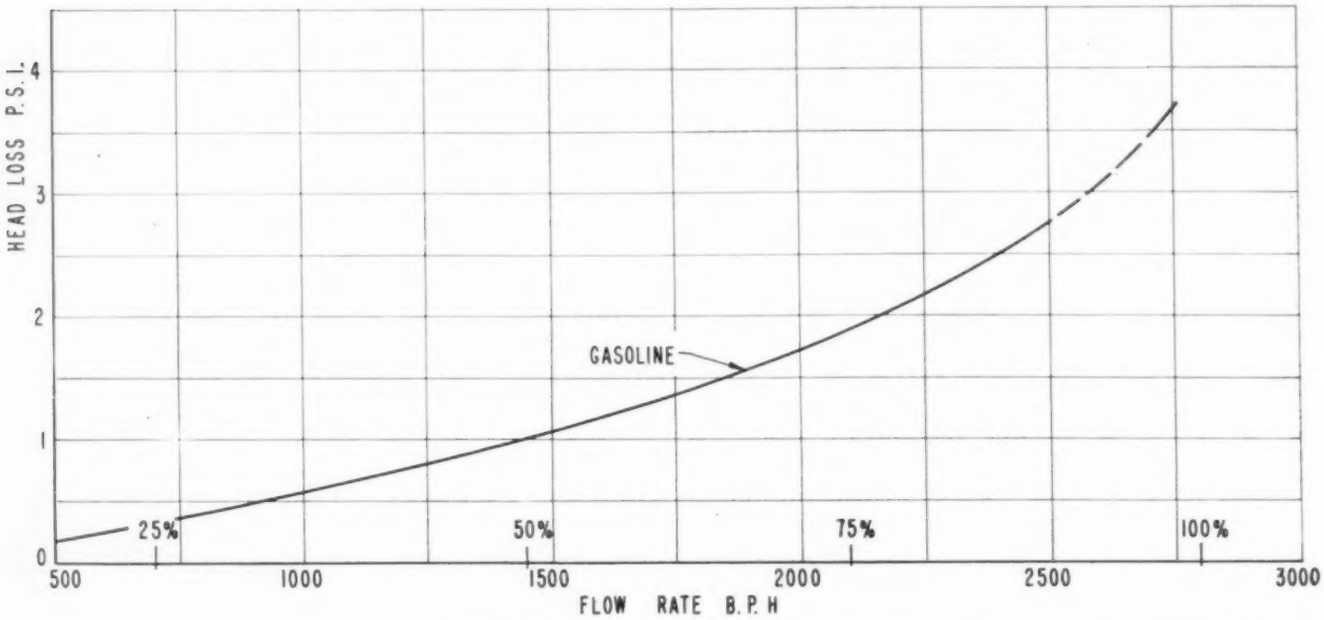


FIGURE 9—Head loss curves for single-case rotary meter plotted from manufacturer's tests.

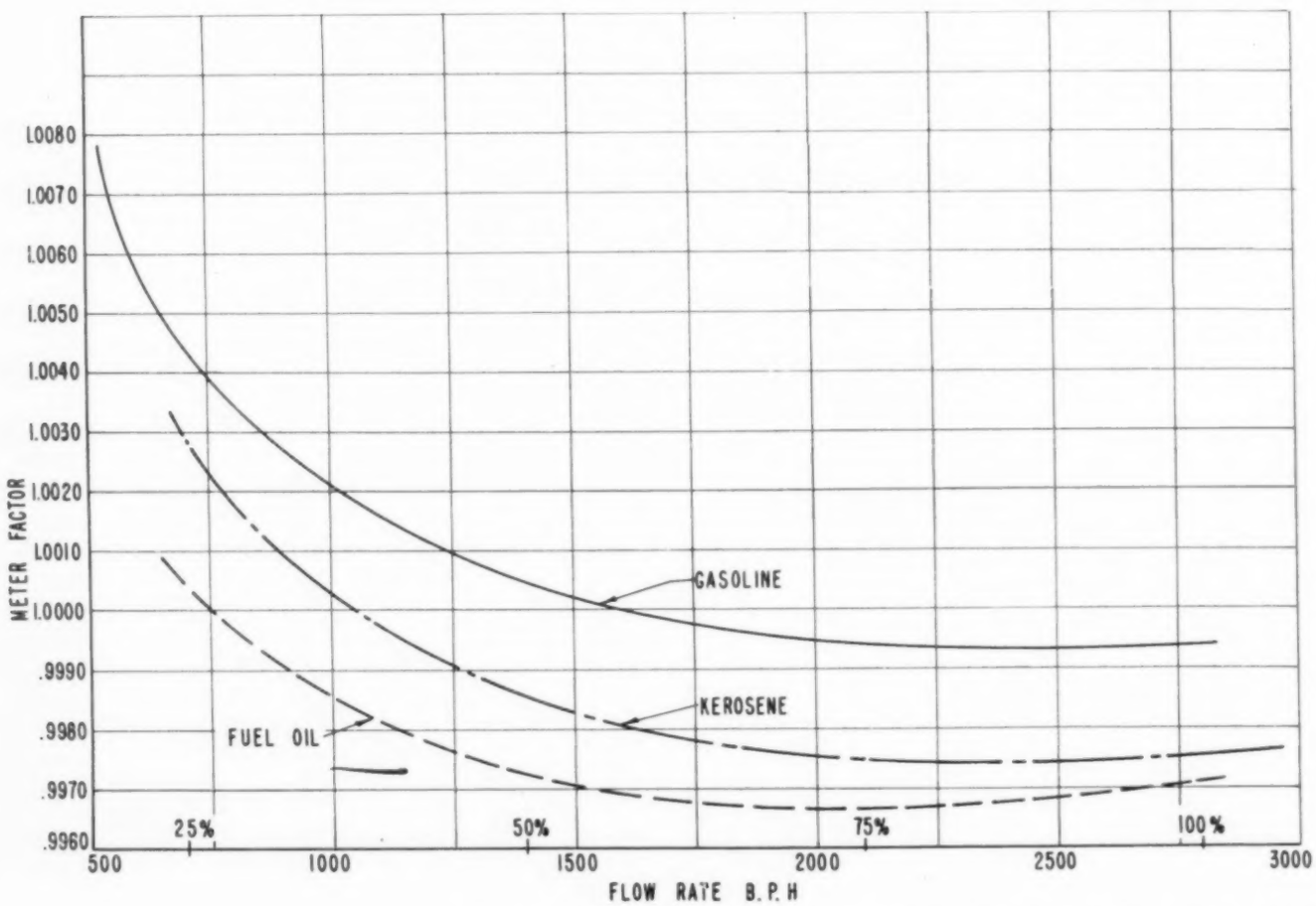


FIGURE 10—Meter factor-flow rate curves for double case helical bi-rotor meter in products service.

cap. It seems probable that some motor-operated valving is justified, especially for the 10,000-bph class.

Calibration Methods Vary. Calibration equipment and procedure for the higher capacity meters is of considerable concern and is receiving just consideration. In view of the time element required to discuss the subject of calibration, it is deemed advisable here only to mention some of the systems which are most being successfully used. They are:

- Calibrated line section with electrical connections to control counters.
- Gravimetric proving with a 70-

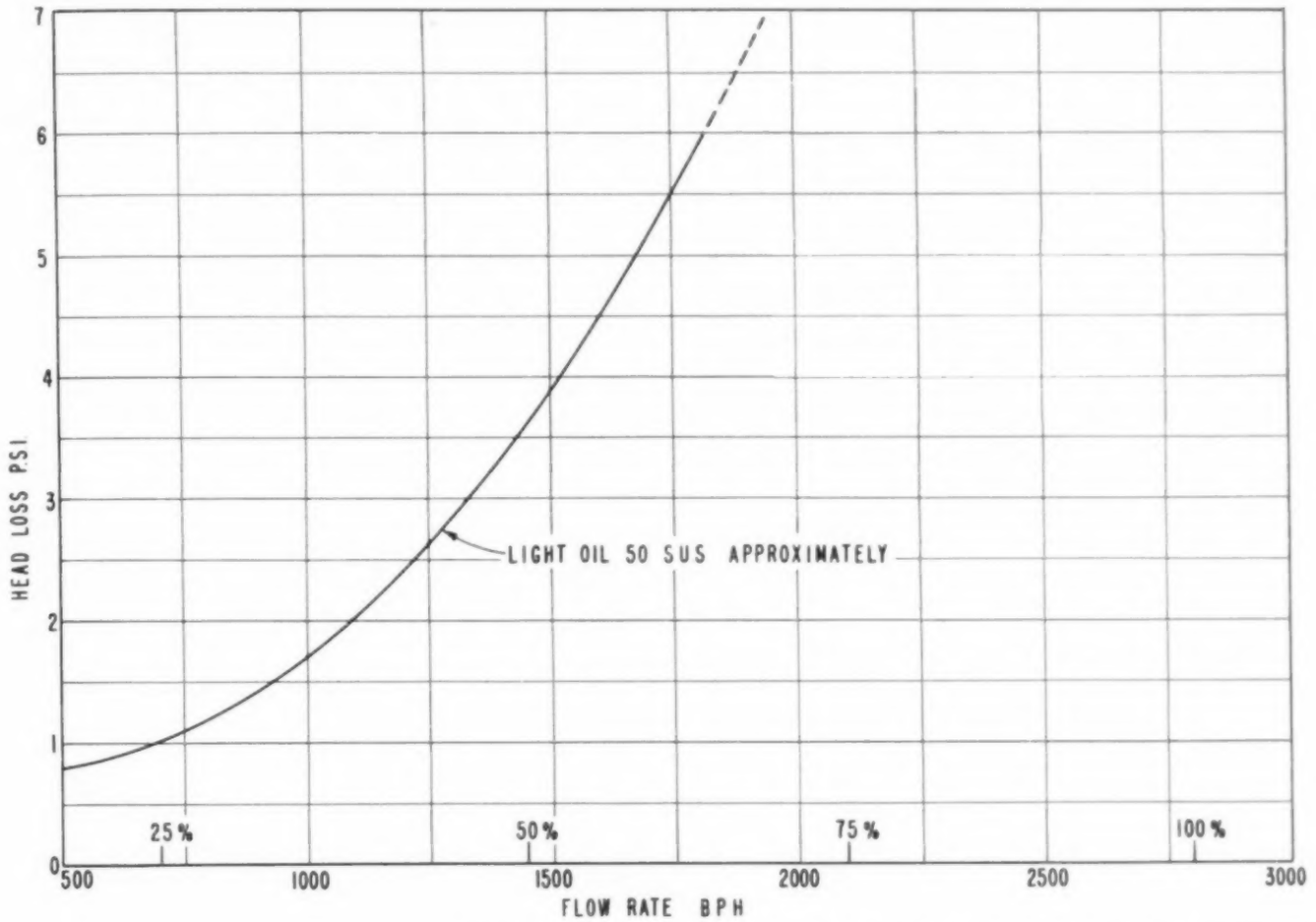


FIGURE 11—Head loss curves for double case helical bi-rotor meter based upon manufacturer's test data.

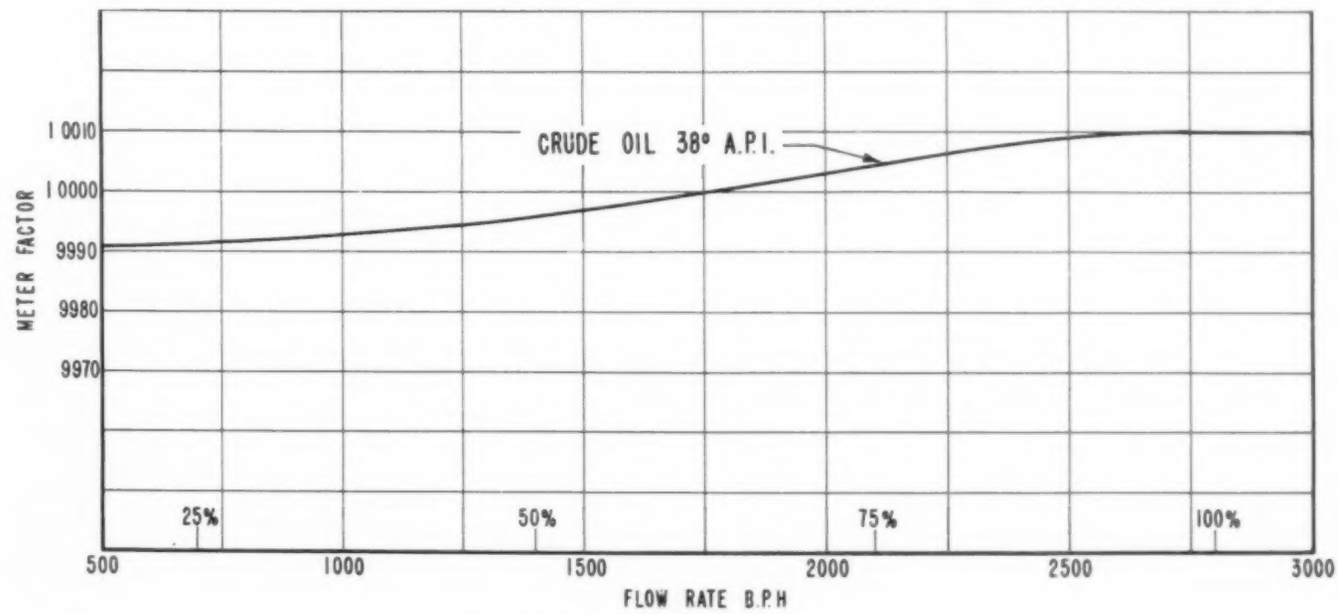


FIGURE 12—Plot of meter factor against flow rate for double-case rotary vane meter in crude oil service.

barrel tank and appropriate scales.

- Volumetric proving employing a 300-barrel tank with a fixed volume between weir lips and reduced cross section for reading the final volume.
- Master meter method employing multiple smaller meters as the master.

Long Service Expected. Maintenance experience on the 2800-bph class meters to date indicates a throughput of approximately 20 million barrels can be expected before major overhaul. This figure varies

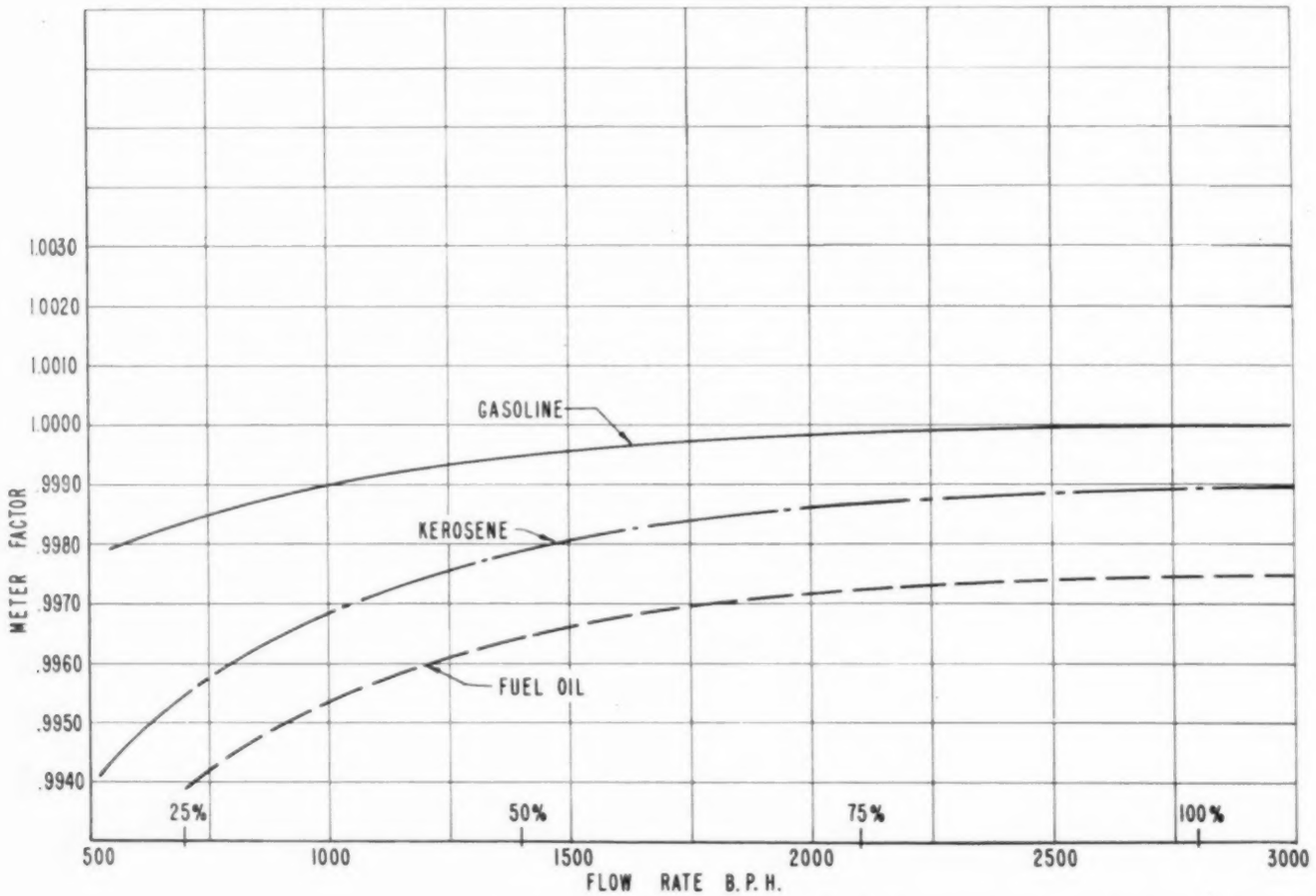


FIGURE 13—Meter factor curves for double-case rotary vane meter in products service.

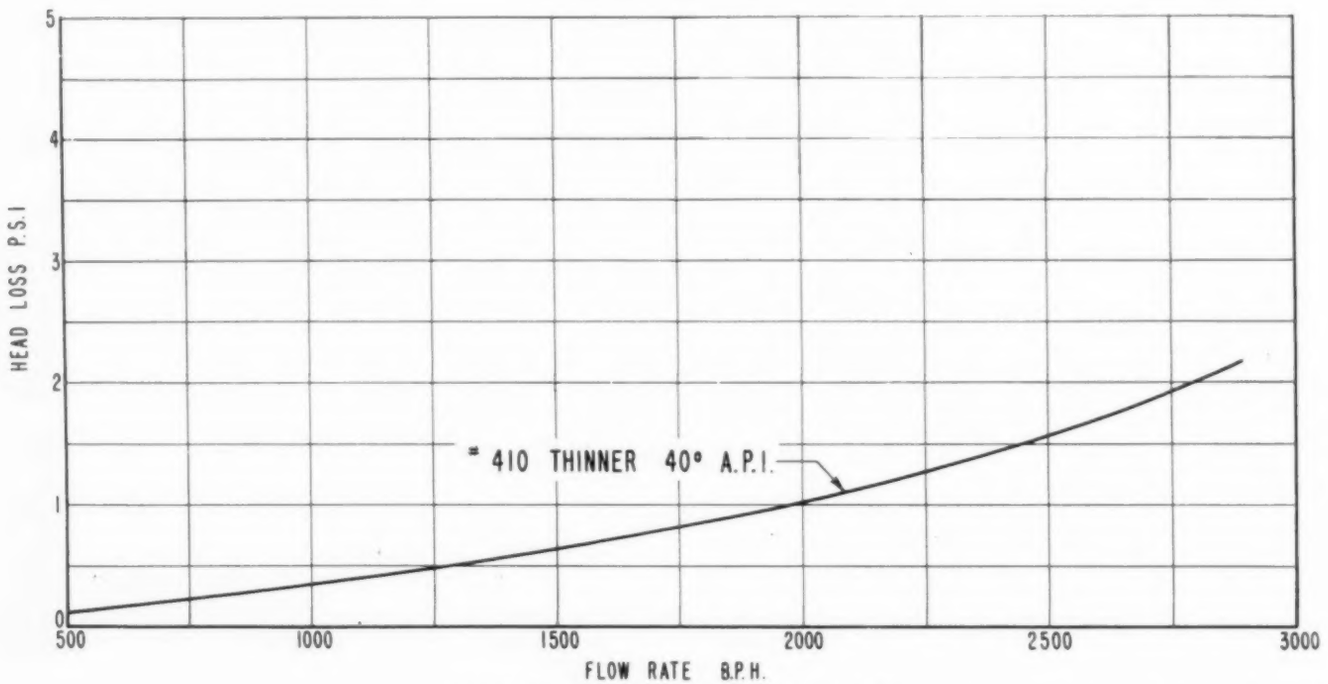


FIGURE 14—Head loss-flow rate plot for double case rotary vane meter from manufacturer's development tests.

somewhat, according to product and operating speeds, but it is fairly reliable. An estimated parts cost for a major overhaul on this type meter is $120.

Experience does not afford a reliable estimate on throughput expectations on the 10,000-bph class meter. Based on inspections to date, however, a long service life is anticipated.

5000-BPH Meters Needed. There is considerable opinion in the pipe line industry that a meter in the 5000-bph range would be desirable. Rates in the 4000- to 10,000-bph range, quite common among pipe lines, are in-between rates as far as the present day high capacity meters are concerned. New 10,000-bph meters have flexibility limitations and cost disadvantage while the 2800-bph class is too small. There are other considerations, of course, depending on individual circumstances but the idea of a 5000-bph meter for pipe line use has enough support to merit some thought on the part of industry and manufacturers.

20,000-BPH Meter? A review of present and forecast marine terminal transfer rates has also created some interest in a meter larger than the 10,000-bph class. For example, a 40,000-bph transfer rate seems to be a common goal among marine transportation interests. For these rates a meter in the 20,000-bph range installed in banks of three would provide a flexible system with standby provisions. Again, this may not be the ideal size meter for the purpose and certainly would not be perfect for all high capacity marine terminals, however, some industry collective thinking on this subject might be well rewarded.

ACKNOWLEDGMENT

Presented at the Annual Pipe Line Conference of the API Division of Transportation, Cleveland, May 5-8, 1957 under the title "High Capacity Positive Displacement Meters."

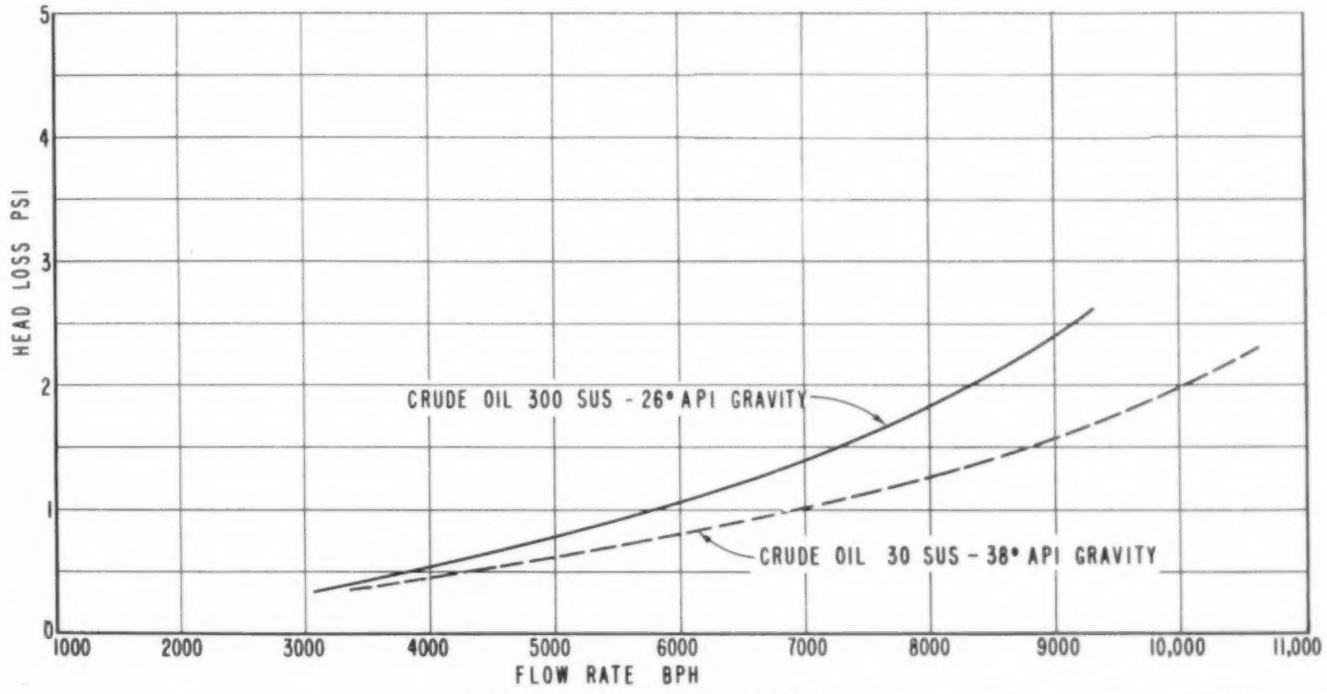


FIGURE 15—Field tests of new 10,000 bph double case rotary vane meter show meter factors at various flow rates.

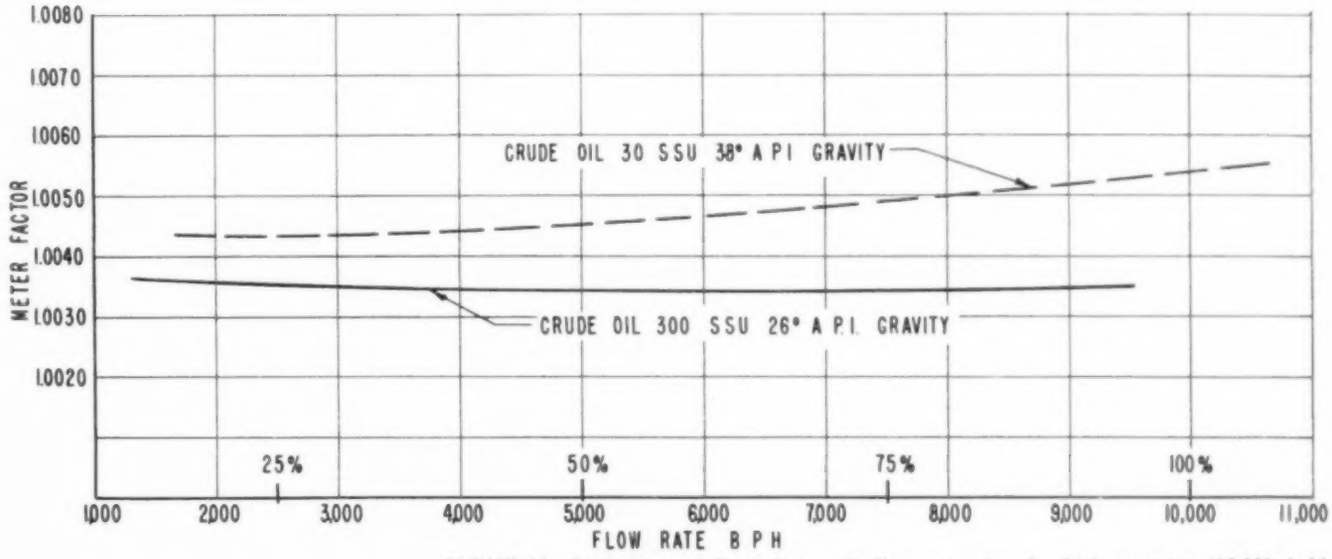


FIGURE 16—Comparison of head loss with flow rates for the high capacity (10,000 bph) meters in early field tests with crude oil.

Background research supplies the facts on which important decisions on employe relations subjects are taken.

New Look in Human Relations

Want to improve employe efficiency—obtain more harmonious industrial relations? Then try these two well known research methods—they will help you accomplish both goals.

By E. L. K. FROST
Esso Petroleum Company, Ltd.
London

TO KEEP PACE with its phenomenal growth and fast-changing operational methods, the pipe line industry is placing more and more emphasis on:

- Training.
- Employe communications.
- Recruitment.
- Management development.

These personnel objectives have been firmly established in most pipe line companies. The big problem now is how to make them pay off. One way, recently introduced to the oil industry, is to use "background" and "direct" research to determine the "inner workings" of employes.

Several oil companies have already adopted these well known research methods as working tools in their human relations studies. And their interest is being transformed to profits through greater employe efficiency and more harmonious employe relations.

Three factors are influencing these companies in their attitude toward human relations research work.

1. They are progressive and keenly interested in research.

2. They believe in the great significance of human factors within the industry.

3. The companies are constantly changing and expanding. They recognize that changes in methods, policies, and organization inevitably lead to changes in human relations problems.

What modern human relations research is attempting to provide is a systematic and objective approach to what has often tended in the past to be intuitive or even hit-or-miss.

We are only on the fringe of understanding the problems of man at work in a complex industrial society. Although interesting work has been done in this field, we must be patient and not rush to secure so-called results.

How can the pipe line industry make use of human relations research in a practical manner? There appear to be two main ways:

1. "Background" research into the facts on which important decisions on employe relations subjects are taken. This includes wages and salaries, cost of living, job differentials, prevailing conditions in other industries, experiences of other companies and institutions, developments in fields such as method study, and so on. "Background research" also includes keeping in touch with major developments in the industrial relations field.

2. "Direct" research into human relations problems. This includes attitude surveys, research into job evaluation, selection and appraisal, interviewing and counseling.

In other words, the first type of research provides the facts. The second attempts to find a common factor in comparable situations.

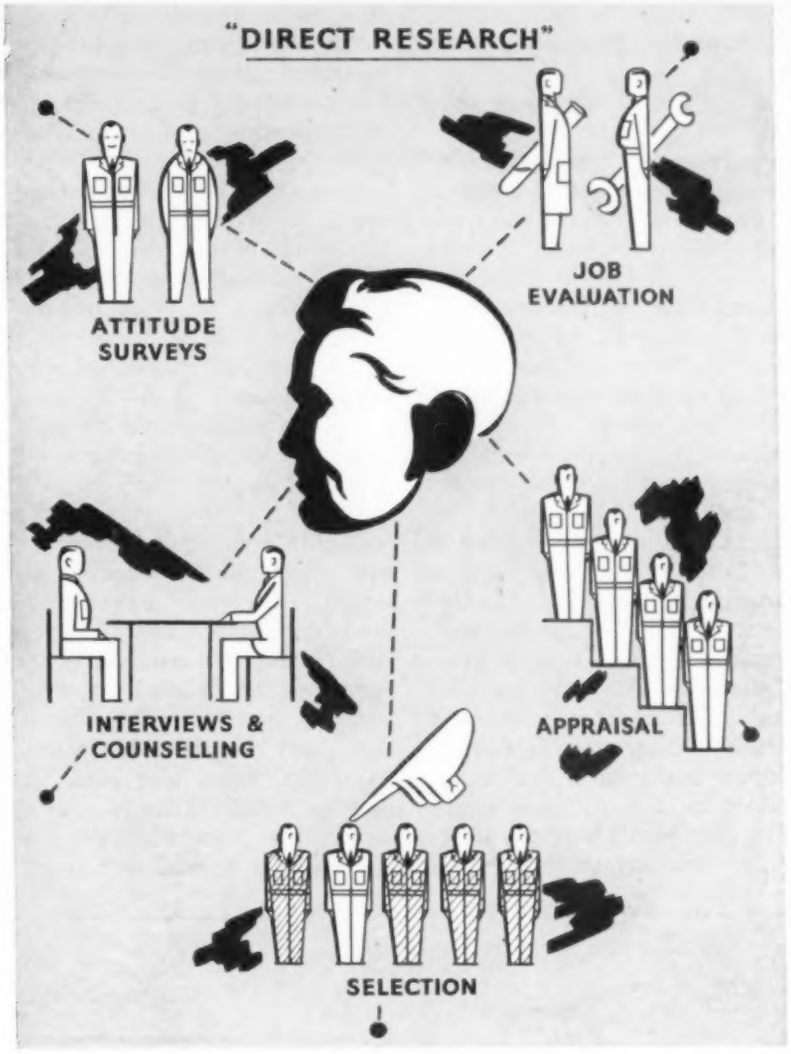
The second type of research is, of course, in its infancy; the number of people who appreciate its value to in-

dustry are infinitesimal in comparison to those who are aware of the value of physical or sales research.

Background Research. Far-reaching employe relations decisions must be based on accurate and objective background research. Any employe relations department in a large industry should have someone whose job it is to provide the basic facts and data on which these decisions can be based.

For example, it is most important that a company should have a just, realistic, flexible and properly understood salary structure. This may not be easy to achieve in—let us say—an expanding and inflationary society. A salary committee must have facts on which to make its decisions. Those facts can only be provided by research into the cost of living, wage rates in other industries, community rates, differentials and labor supply and demand.

Although a company will naturally make its own individual decisions, it is important for it to keep up-to-date with developments in the human relations field in other industries. No company would dream of going over the same ground with regard to research in the physical sciences—it makes use of and profits by the experience of others. Although the human situation is different in every company, there is often revelant data to be obtained—and it is uneconomic not to do so.



Direct research into human relations—this includes attitude surveys, research into job evaluation, selection and appraisal, interviewing, counseling and so on.

Direct Research. Despite the rather tart comment by one writer that every time a manager looks around these days he's sure to find a social scientist studying people at work, there is still too little objective on the problem of human relations in industry.

Undoubtedly the famous Hawthorne experiments carried out in the U. S. by Elton Mayo gave great impetus to the realization that it was possible to locate human factors which had a definite effect on production and efficiency. In the oil industry, there have been well-known surveys carried out in the Esso Standard Oil Company by Elmo Roper.

Well-handled, and in the hands of specialists, the attitude survey can undoubtedly prove of great assistance in assessing the general level of morale in an organization, and in revealing problems. It can also stimulate the interest of management and supervisors in human relations problems; as well as giving employes the chance to voice their views and get their problems "off their chests." The survey also shows employes that the company is genuinely interested in their attitudes and opinions.

In addition to keeping its surveys objective, a company must remember that employes expect to be informed of the broad findings—otherwise they will be less disposed to be frank and co-operative when the next survey is made.

In the oil industry, some interesting research is being conducted by one large American company on the problem of trying to find potential for management jobs. In an industry calling for management of the highest quality, any valid information which could help a company to recognize factors common to successful—and non-successful—management will be of inestimable value in assessing potential executives early in their careers.

Merit-rating is another subject that has been undergoing research in our industry; Jersey's study, "Made to Measure," is a fascinating account of an experiment in a new method of indicating job performance.

Communication Research. A valuable field for research is that of a company's communication methods. Oil companies spend a tremendous amount of money in communicating to their employes—and in getting their employes to communicate to them. Some attempt must be made to assess the effectiveness of a company's communication methods. For example, it is obviously wasteful to produce an employe newspaper regularly without carrying out some objective research to determine whether it is proving effective.

Among many questions in this field which merit investigation are:

Are there blocks in the communication channels, upwards or downwards?

Are executives burdened with paper work?

How over-worked is the grapevine?

How does the speed and quality of a company's communications compare with that of the trade union?

Organization and Group Research. Two subjects that have provided an incentive for research in recent years are those of organization, and of working groups.

Sometimes a company's organization is considered to be sacrosanct, and pre-ordained. In fact, an organization structure comes into being in response to the work and function of the company, and too often it is kept in being when the work and functions have changed. In this type of situation, the organization may carry on for a while under its own impetus, but sooner or later it will begin to break down under stress and strain.

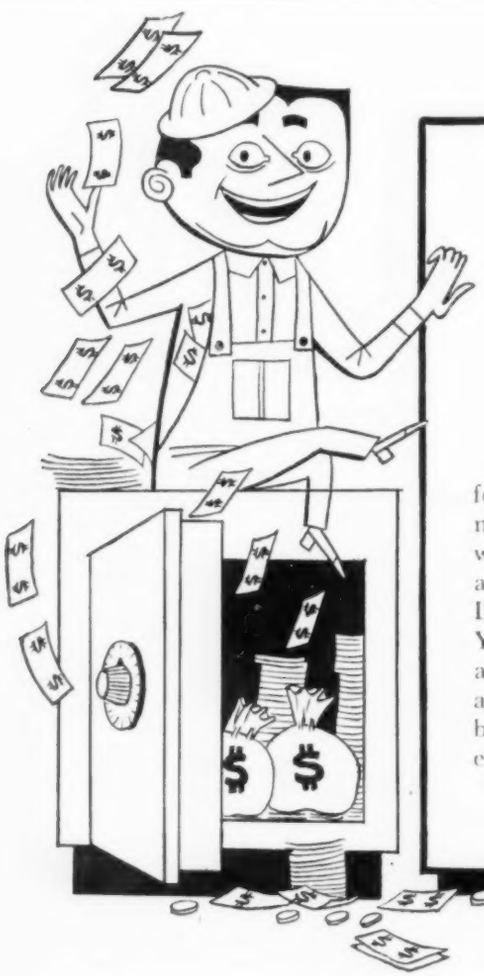
Certainly in the U. S. in recent years there has been a tendency to get away from regarding an organization structure as sacred—and some interesting experiments with rather unorthodox organization structures have led to reducing the numbers of levels of management and supervision.

Recent research in group psychology provides some interesting evidence of the effect of the attitude of the group or team on morale, efficiency, employe turnover, and absenteeism. When one recognizes that the group's attitude in turn very often stems from the influence of one "unofficial leader," then the need for teaching management to recognize and make use of the influence of the unofficial leader is a very practical one.

Finally, training is a major subject that offers tremendous scope for research. In recent years, heretical voices have been raised suggesting that training is largely a waste of time, and that it has little or no impact on those submitted to it. Of course any company who spends, say, $5 million on a new plant, knows only too well that in order to manufacture and market a new product, men must be trained to manage and man the new equipment, and to sell its products.

However, training in an established operation that has been going on for a few years is not always received with such enthusiasm. Here the trained research man has an important job to do in evaluating the impact of such training on those who undergo it.

Industry—and the Psychologist. The psychologist has not always been hailed with enthusiasm in the oil industry, but undoubtedly he can help us in dealing with our problems. One of his most important contributions has probably been in that of selection. Research into methods of selecting new employes is definitely time well spent—especially in a vital and expanding industry such as ours that places great emphasis on the quality of the men and women employed. If research can provide any improvement in selection techniques, then it will be helping management to undertake one of its most important functions—choosing the right man for the right job. —**The End**



it will PAY you to give us the WORD

ON THE OPPOSITE page is a new and expanded Rule of Thumb feature. This new feature will include graphs, charts, data tables and nomograms in addition to the usual time-saving Rules of Thumb. They will be selected to help you solve engineering, design and construction and operating problems. This feature will appear in each issue of PIPE LINE INDUSTRY and contributions from our readers are solicited. You'll find they pay two ways. You can profit from the ideas of others and PIPE LINE INDUSTRY will pay a contributor $25 for each idea accepted pertaining to engineering data. Rules of Thumb are still being accepted at regular payment of $15 each. Send us your favorite engineering idea or Rule of Thumb.

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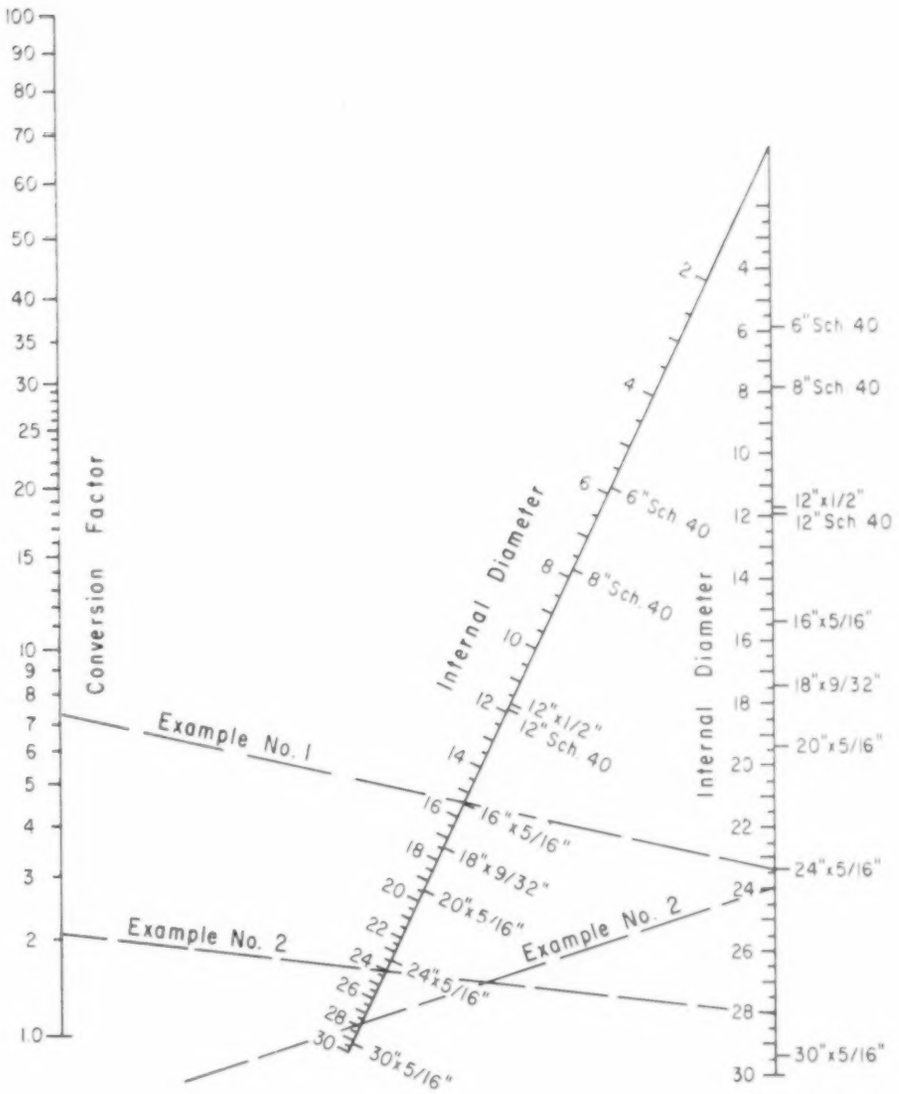


Engineering Design

—30—Nomograph for determining pipe-equivalent factors.

For turbulent flow, this handy nomograph will save a great deal of time in flow calculations where different sizes of pipe are connected. The advantage over a table of values is in having all sizes of pipe expressed in relation to any other size.

Example 1. $16'' \times 5/16''$ in terms of $24'' \times 5/16''$

$$\left(\frac{23.375}{15.375}\right)^{4.735} = 1.5203^{4.735} = 7.26.$$

Example 2. Reciprocal values can be found when chart limits are exceeded. 28" I.D in terms of 24" I.D. falls beyond the lower limits of the chart, however 24" I.D. in terms of 28" I.D. gives a conversion factor of 2.1.

Know the danger signs of hydrogen sulfide gas. Here a safety inspector uses an H_2S detector over an excavation where hydrogen sulfide gas is suspected. He is wearing a canister-harness type gas mask for added safety.

Stay Alive

By ANTHONY GIBBON
WORLD OIL Staff

CERTAIN PIPE LINE jobs present peculiar hazards. To the pipe line man, especially if he is a gager, maintenance man, or station operator handling sour crude, one of the hazards against which he must guard constantly is that of hydrogen sulfide (H_2S) gas. This poisonous gas may be found in greater concentrations in some areas than others, but it is a potential danger, and the man who wants to stay alive on the job will take no chances.

Sour Crude Can Kill. Safety habits are particularly important when working in sour crude oil fields. Safety men stress that the hazards cannot be emphasized too strongly. Breathing air that contains hydrogen sulfide gas in sufficient quantities affects the respiratory system. A concentration of only 0.15 percent of H_2S in air inhaled for 2 to 15 minutes may cause death. Contact of this gas with the eyes causes much discomfort and sometimes injury. For these reasons, each installation that handles sour crude should be equipped with hydrogen sulfide gas detectors and personnel protective equipment.

A hydrogen sulfide gas detector is a hand instrument used to determine whether the gas is present in dangerous proportions. Station personnel exposed to this hazard should learn how to use this important piece of equipment. Any time there is doubt as to the presence of H_2S the instrument should be used to determine if it is safe to work without wearing a gas mask. If gas is present, the reading will indicate what type mask should be worn.

Gas Mask Is Best Protection. Gas masks are standard equipment in

FACTS ABOUT HYDROGEN SULFIDE (H_2S)

You should know it is

- Colorless and inflammable
- Heavier than air—accumulates in low areas
- Smells like rotten eggs but after one whiff of high concentration, the sense of smell is dulled
- Tastes sweet
- Almost as toxic as hydrogen cyanide and five to six times as toxic as carbon monoxide
- You cannot develop a tolerance for it by frequent exposure
- Irritating to air passages and lungs
- Widespread in crudes handled
- Concentrated in toxic amounts in many crude oil storage tanks

SYMPTOMS OF INJURY

Acute case—high concentration breathed

- Panting respiration
- Palor
- Cramps
- Paralysis
- Almost immediate loss of consciousness and speech

Irritation case—low concentration

- Irritation of eyes and respiratory system
- Deep depression of nervous system

TREATMENT

- Get victim to fresh air as quickly as possible
- Keep him at rest and prevent chill
- If breathing has stopped, apply artificial respiration until a physician arrives

PREVENTION

- Keep to upwind side of gas source if known
- Don't stand directly over thief hatch or gage hatch
- Wear proper protective equipment
- If possible work in pairs in danger areas
- Watch out for unwary visitors—help them take care of themselves.

Around Sour Crude

Follow these few simple rules to avoid injury when working with crudes containing hydrogen sulfide.

guarding against hydrogen sulfide poisoning and all personnel should become thoroughly familiar with them so that the right type mask may be used for the hazard involved. The proper mask must be used to give complete protection.

Several types of gas masks are used in the pipe line industry. They include the canister mask, self-contained breathing air mask and the blower mask. Masks must be maintained in good condition, periodically inspected for defects, and tested each time before they are used. They should be kept clean, and the face-piece disinfected each time the mask is to be worn by a different person. However, in most instances each person who may be frequently exposed to H_2S is furnished a private mask for his own use.

Always Test the Mask. Before entering a contaminated area, the wearer must test the gas mask by kinking the air-supply hose and breathing deeply. If the face-piece collapses, there are no leaks—if it does not collapse, there is a leak that must be found and corrected before the mask is used. However, before a test is valid and the mask can be safely used, check the face-piece to be sure it fits snugly and comfortably.

Keep Canister Log. A canister type mask is for use in areas having low concentrations of hydrogen sulfide in the air. Safe limits are printed on the canister. This type mask is not safe unless there is sufficient oxygen present to sustain life. Each canister may be safely used only for the period of time designated by the manufacturer; a card to log the hours used is furnished. Each time the canister mask is worn, the wearer should note the length of time it is actually in use. THIS IS IMPORTANT. Do not shirk this menial chore, for any reason, as it might endanger the life of another employe, or the wearer himself later. Anytime that there is a doubt as to the length of useful time left in a canister, it is best to play safe and install a new one before wearing the mask.

A self-contained breathing mask is designed for use in areas where the percentage of gas exceeds the safe limits of the canister types, or where there is not enough oxygen to support life. This mask will give full respiratory protection against harmful vapors until the supply of "bottled" air is exhausted. Under normal conditions, a full bottle of air will last approximately 20 minutes. A half-mask face-piece (sometimes used with the canister type mask) should never be used with this equipment.

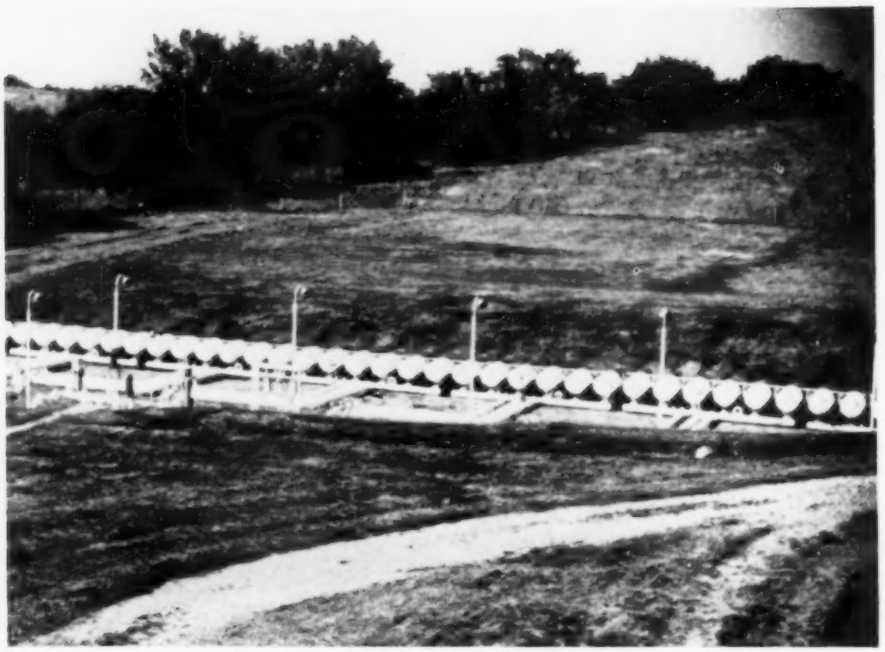
Blower Mask Used in Pits or Tanks. The blower mask is also designed for use in areas where the concentration of gas exceeds the limits of the canister type mask, or where there is not enough oxygen to support life. It is particularly useful if the wearer must remain in the contaminated area for long periods of time. Fresh air is provided through a hose connected to a hand operated fan, which is built into an ordinary trunk. These masks are worn in bell-holes, pits, cleaning storage tanks or any place where the gas concentration is very high.

A safety belt and life line should be used in conjunction with this equipment, enabling a man to be pulled out of danger in case anything goes wrong with the mask. After an employe puts on a mask, before he enters the contaminated area, the supervisor should personally check all hose connections for leaks or obstructions that might prevent an adequate supply of fresh air from reaching the person wearing the mask.

Hydrogen sulfide may cause unconsciousness or even fatalities—one case is known of a gager that was overcome by the gas, and fell into a storage tank. Employes must always be on their toes in guarding against such instances as this. Care should be taken to see that masks are worn when needed and that the proper masks are used for existing conditions. All masks must be kept in perfect condition. Almost all of the injuries from inhalation of H_2S have resulted from carelessness and a slackening of precautionary measures on the part of supervisors and employes. —**The End**

When working in areas where hydrogen sulfide gas concentrations may be encountered, wear a gas mask. This field gager on a tank in sour crude area of West Texas is protected by a canister type mask.

What Phillips learned from . . .



Regardless of the volume of underground storage available, some "above ground" tankage is required for quality control. Here 42 lengths of 30-inch pipe supply 34,000 barrels of capacity near a terminal point.

Pipelining LPG

Mechanical seals, higher pump suction, slight deration of pumps, proper buffering and special repair precautions solved the most serious problems

By F. B. NEPTUNE
Phillips Pipe Line Company, Bartlesville

MORE AND MORE interest is being shown by the pipe line industry in the handling and transportation of LPG. This is not surprising, considering the rapid growth in the marketed production of LPG booming to a record 7 billion gallons in 1956. An increasing share of this large sales volume will likely move from manufacturing areas to consumers by pipe line during the next few years.

Phillips Pipe Line Company has been pipelining butane for more than 25 years and handling propane for 10 years. Since 1947, some 17 million barrels of propane alone have been shipped.

Answers to some of the toughest problems faced since LPG operations first began may be of help to other pipe line companies.

- It was necessary to convert to mechanical seals on multi-stage centrifugal pumps to handle propane safely.
- Higher pump intake pressures were used to overcome propane's high vapor pressure.
- Added effect of lower specific gravity of LPGs necessitated some derating of pumps.
- When shipping LPG through the same lines as distillates, especially where internal scale exists, care had to be taken to provide suitable buffers to prevent contamination.
- Tankage should be furnished by the shipper. If the pipe line has to supply storage, tariffs must be somewhat higher to pay for the expensive storage needed. Even where economical underground storage in mined or washed caverns is available some aboveground steel tank storage is usually needed, too.
- Special safety precautions are needed when repairing leaks in lines handling LPG. Each situation calls for careful consideration of leak size, slug volume and location, and particular operating conditions.

Packing Cut Out by Scale. When Phillips original 8-inch line was built from Borger, Texas to East St. Louis, Ill., in 1931, the line was tested with water. Because all of the horsepower on the line was furnished by butane-burning gas engines, butane was put into the line immediately behind the test water so it could be drawn off as engine fuel.

While this scheduling was desirable as a means of supplying the initial fuel requirement of pumping stations, it

The rapidly increasing use of underground storage in washed salt cavities and other such mined caverns as this one lowers the cost of LPG storage.

Freezing and icing up of ground around an LPG pipe line leak makes hazardous repairs even more difficult. This crust was 12 inches thick and over 150 feet in diameter.

created a number of serious problems. Line scale cut out pump packing and permitted large volumes of butane to escape in the pump rooms, creating very hazardous conditions at nearly every station. In those early days operators spent more time in repacking pumps than in any other phase of the operations.

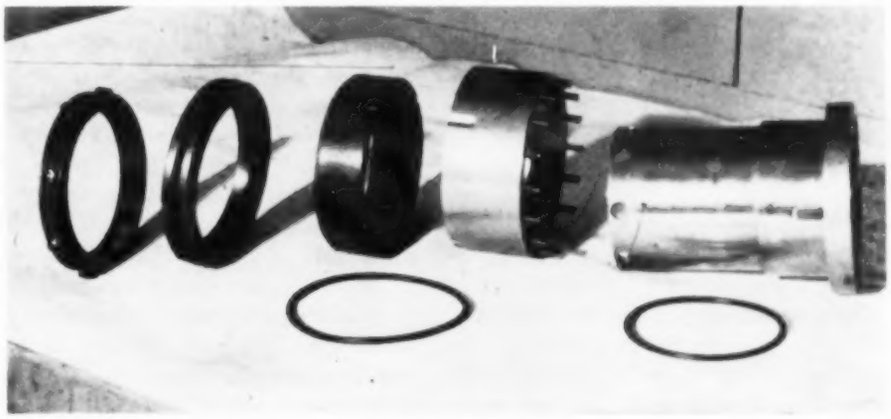
Hilly Sections a Problem. Furthermore, when the butane and water got into the hilly section of Missouri, between Paola and St. Louis, the light products in effect created a series of U-tubes with butane in one leg and water in the other. At one time discharge pressure at Paola station was 1000 psi and line pressure was zero a few stations downstream. Obviously nothing was moving.

To get the stream moving it was necessary to tap the line in all the low places and draw down the water. With some butane present, extreme frosting and freezing resulted. If a new line must be tested with water, a heavier product such as gasoline or kerosine should be put through the line before introducing butane or propane.

Storage Varies. Storage for propane at pipe line origin and at terminals can be either aboveground or underground. Usually, some aboveground storage must be provided for quality control and to maintain the desired feed rate to the pipe line. It will normally be expensive and impractical to attempt to feed a high-volume pipe line from an underground source. This would be particularly true if the product must be refractionated and dried as it comes out of storage.

Several types of storage are commonly used today for storing propane along pipe lines. Perhaps the most widely used type of high volume storage is the underground cavern washed from a salt bed. While this type of storage is relatively inexpensive, location is limited by the availability of suitable salt strata. Successful underground caverns also have been mined in hard rock or shale formations. Conventional aboveground storage is expensive but has the advantage of flexibility of location and lends itself much better to quality control.

Higher Intake Pressures. Other than pressure storage, no special equipment is required at the originating pump station. However, where propane is batched with other products of lower vapor pressure, the feeder or station booster pumps must have sufficient head to overcome the vapor pressure of propane at the highest temperature at which it will be pumped. A typical commercial propane has an NGAA vapor pressure of



Exploded view of typical mechanical seal for main line centrifugal pump. High pressure seals proven in joint industry-manufacturer tests solved the problem of gland leakage of butane and propane.

85 psi at 50° F. and 190 psi at 100° F.

Normally it is necessary to have a high head pump only for the products which will displace propane in the feeding cycle. For example, if butane is always used as a buffer for propane, the butane feeder pump should have a head sufficient to overcome the vapor pressure of the propane. Similarly, the feeder pump handling material following butane must have a head sufficient to overcome the butane vapor pressure.

Moderate Line Pressure. Depending upon the upstream profile and the temperature of the batch, station intake pressure must increase as propane approaches. A table can be prepared setting out minimum intake pressure for various temperatures. If the vapor pressure of the propane is likely to vary slightly, due to its composition, an allowance must be made to be on the safe side.

Vapor Pressure Tester. Another method is to install a propane vapor pressure tester at each pump station. A simple, but effective and inexpensive assembly can be used for determining the approximate vapor pressure of the product passing the station. Its operation is simple:

The station operator first receives the head end of the propane slug at some predetermined pressure which would be on the high, or safe, side. He then finds the minimum allowable intake pressure by these steps.

1. Opens the expansion valve wide open and notes the temperature on the dial thermometer.
2. Checks the pressure gage against the station suction pressure to be sure the gages are in reasonable agreement.
3. Throttles the expansion valve, reducing the pressure on the gage by 5 psi steps, noting the temperature at each step.
4. When the temperature starts to drop, vaporization is taking place. Note the pressure on the gage and then operate with an intake pressure about 20 psi greater.

Compressibility Can Be Helpful. Propane is highly compressible. At 60° F., a pressure change of 1000 pounds will compress it approximately 4 percent, as compared to less than 1 percent for products in the motor fuel range. On a loaded or fully packed line, this compressibility can be troublesome from a metering and measuring standpoint; but it is beneficial from a safety standpoint. The propane slug serves as a resilient element in the stream and tends to reduce shock in case of sudden horsepower loss or in case of a valve being closed suddenly against flow.

About the Author

F. B. NEPTUNE, a graduate in oilfield management from the University of Oklahoma, joined Phillips Pipe Line Company in 1931. Originally with the Research department, he later became chief chemist at the East St. Louis products pipe line terminal, superintendent of the East Chicago products terminal and assistant manager of the products pipe line. Neptune is now serving as vice president of Phillips' Products division.

Pump Deration Varies. Because of its low specific gravity, centrifugal pumps operating on propane produce less pressure differential than is the case with heavier products. In case of variable speed prime movers, this loss of pressure differential can be partially compensated for by operating the prime mover at increased speed while propane is passing the station.

A pipe line system with motor-driven centrifugal pumps will suffer some drop in throughput when pumping propane, both from lowered pump pressure differential and the necessity of holding high intake pressures. This deration will vary with slug size, station spacing, number and location of intermediate bleed-off terminals, but will be less than deration from the distillates.

Buffering Minimizes Contamination. The internal condition of the pipe line bears an important relationship to the amount of contamination which can be expected while pumping LPG. This contamination is in the sense of very small quantities of impurities extending completely through, or largely through, an entire batch of propane or butane rather than the usual interface of a comparatively few barrels normally experienced between products. This so-called "slug contamination" must be considered because of rigid residue specifications.

The interior of Phillips 6-inch Borger-Denver pipe line laid in 1947 is known to be almost completely free of internal corrosion. This is because the line has been continually dehydrated and the "C" factor has remained equal to the original new pipe value. On this line it is possible to pump comparatively small slugs of propane, along with heavier products such as stove oil and furnace oil buffered by only a few barrels of butane, approximately 355 miles to Denver and deliver on-specification propane at the Denver terminal.

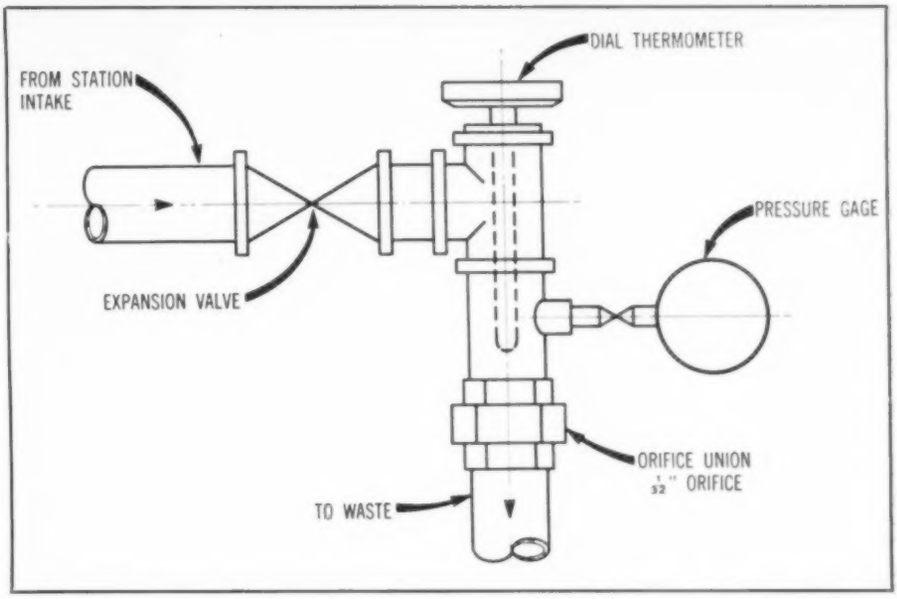
On the Borger-Chicago line there is a somewhat different condition. The greater part of this system consists of pipe 18 to 26 years old which was not adequately protected internally. It is known to be rather heavily scaled. This system actually consists of two parallel pipe lines with common pumping stations. Here it is desirable to limit LPG pumpings to one line and to pump the distillates in the other. Natural gasoline, motor fuel, aviation gasoline and motor fuel base, however, are pumped in either line.

Scale Causes Contamination. With a heavily scaled line, oils tend to remain in the scale and are released into the LPG as "slug contamination" extending through all, or a large part, of the LPG batches which follow. In cases where it has been necessary to pump LPG through the internally scaled pipe, large buffers of natural gasoline were pumped ahead of the LPG batch; however, it is recognized that many pipe line carriers will not have available such large slugs of natural gasoline to serve as a washing agent ahead of the LPG slug.

Interface Disposal a Problem. In a system handling all finished products, as opposed to one handling blending stocks and completing the blending at the terminals, there is a problem of disposal of the motor fuel-butane interface and the butane-propane interface. If motor fuel is delivered to the carrier at maximum volatility, no butane blending can be

tolerated at the terminalling point. Therefore, unless the shipper is in a position to occasionally furnish a sub-specification motor fuel, it is not possible to blend off the motor fuel-butane interface and it must be disposed of some other way. The butane-propane interface can generally be sold as a mix, if it is on-specification otherwise.

By keeping distillates out of the line which handles LPG and by proper buffering, it is possible to deliver on-specification propane at all intermediate terminals between Borger, Texas and Kankakee, Ill. The most remote intermediate terminal is 680 miles from origin and to date no difficulty has been experienced in successfully taking off heart cuts of specification product after transporting propane through 8, 10 and 12-inch pipe.



A simple, inexpensive vapor pressure tester is useful for determining the minimum pump intake pressure for handling propane. Pressure gage shows vapor pressure directly when expansion valve throttling causes a sharp drop in temperature.

Mechanical Seals Help. For safe operation in pumping a highly volatile product such as propane, mechanical seals are strongly recommended for all main line centrifugal pumps. On the Borger-Chicago system, which uses centrifugal pumps exclusively, failure of conventional lead and graphite ring packing when pumping butane was a source of constant trouble and represented a real hazard when the packing failed.

After some experimenting, force-feed lubricators were used to feed lubricating oil under pressure to a lantern gland placed in the middle of the seal ring assembly. Packing ring failure and gland leakage was reduced. However, when it became necessary to transport propane on the Borger-Chicago line in 1952, this method of packing lubrication was not at all satisfactory; packing failure was too frequent to be tolerated.

Fortunately a research and testing program, sponsored jointly by one of the major products pine lines, two pump manufacturers and several manufacturers of mechanical seals, had resulted in the near-perfection of a partially balanced mechanical seal which would hold propane at pressures of 1100-1200 psi.

Stations Shut Down. After pumping one slug of propane from Texas to Illinois, the operation was considered too hazardous for pumps equipped with conventional lead-graphite packing. Installation of mechanical seals was begun immediately and until these seals were installed propane slugs were reduced in size; stations were also shut down while propane was passing.

Remotely Operated Valves. The pipe line carrier may or may not own or control aboveground storage for propane. However, as a matter of safety, it is recommended that all aboveground storage of this type be equipped with remotely controlled internal valves. These valves can be closed in event of emergency from a remote location. Both hydraulic and electrical types have been found satisfactory.

Blow-Down Lines. Occasionally it will be necessary to take a main line unit off the line while propane is passing that station. If it is necessary to work on the pump, the product trapped in the pump and the pump leads must be removed. It is desirable to equip each pump in propane service with a blow-down line extending to a riser located a safe distance from ignition sources. Since each gallon of propane will convert to approximately 36 cubic feet of vapor, it can be readily seen that without such equipment, handling a large volume of vapors would create a problem.

Special Tariff. Phillips Pipe Line has published a special tariff for the transportation of propane which provides the same rate as for other products; but it specifies that the shippers will provide all storage and related facilities for handling propane at origin and destination. It also provides a 2 percent loss allowance for the benefit of the carrier. Because of the high cost of pressure storage, it would be necessary that this cost be reflected in tariff rates if the carrier furnished such storage.

Leak Experience Low. Although Phillips has handled 17 million barrels of propane in the past ten years through systems containing some pipe which has been in the ground since 1931, leak experience has been reasonably good. The only two potentially hazardous leaks experienced were not caused by failure of the pipe due to corrosion, but by road-working equipment cutting the line. Only one major pipe failure was charged to corrosion while propane was in the section, and this failure occurred in a remote area.

There has never been a fire or explosion on these pipe line systems caused by propane. This includes not only the transportation phase, but also storage and loading at terminals. Actually, with suitable equipment and proper handling, propane offers no more hazard in the line and less hazard at terminals than other products.

Leak Repair Practices. Unless it occurs in an area where even minor escape of vapors creates a hazard, it is best to pump the LPG by the leak area and make repairs to small leaks

when a less volatile product is passing. Ground at the leak location is invariably frozen from evaporation of leaking propane or butane and uncovering the pipe is difficult, slow and somewhat hazardous.

Large leaks, of course, require a shutdown, but this does not stop escape of product. Generally, in case of a large leak, the only recourse is to shut down, eliminate all possible sources of ignition, move people out of the area and close all roads in the area. Of course, any block valves on each side of the leak area should be closed as soon as possible. If there is a considerable distance between block valves, the hazard in the leak area can be reduced by tapping the line at a safe location between the blocked valves and flaring the product. Also, if a water source is available, water may be introduced upstream of the leak and pumped until the volatile material is pushed past the downstream block valve. If the leak is large enough, all of the volatile material will have escaped before anything can be done.

Since the ground will be frozen in the leak area it is a good idea to stock pipe and the necessary fittings at strategic locations along the system so repair crews can cut in and lay a temporary line around the leak without waiting for line cover to thaw.

Perhaps the most troublesome type of leak which might be encountered is one which is too large to allow pumping by to a less volatile product and yet not so large but that many hours, or even days, would be required for the product to vent itself between any valve closures which might be effected. For these leaks tapping and plugging machines may be used to confine the product loss to a relatively small section of the line.

While Phillips has had no occasion to use this equipment under emergency conditions, experiments with two well-known makes of tapping and plugging equipment showed that both are effective in blocking off propane under moderate pressure. Plugging equipment will hold the vapor pressure of the propane, plus a reasonable static head.

ACKNOWLEDGMENT

From a paper presented at the meeting of the Natural Gasoline Association of America, Houston, April 24, 1957.

If Oil Could Speak

If oil could speak it would have many fascinating truths to tell the non-oil public—truths that would win thousands of new friends for the oil industry.

But, oil can't speak—you can. You, as an individual, can win many new friends for the oil industry if you will pass the true facts on to your non-oil industry friends.

Here are some of those true facts. They are being presented for one purpose: To keep you posted on your industry, so you can tell the story oil is unable to relate.

Read these facts. You will find them informative—and interesting.

"If Oil Could Speak" it would tell the American public:

•

- To fill a medium-sized oil tank ship would require the liquid cargo of nearly eight hundred of the big clipper trucks that haul oil on highways and at airports.

•

- One large steel-producing company burns enough petroleum fuel in one year to heat a five-room house for 380 centuries!

•

- Petroleum and its products make up the largest category of barge shipments, followed in order by coal, sulfur, chemicals, iron and steel, sand and gravel, and grain.

•

- The service station is one of the greatest points of sale in America today—more than 12 billion dollars' worth of high-quality products flow through these "islands" every year.

•

- The energy obtained yearly from crude oil and natural gas is the equivalent of the work of 33 servants for every man, woman, and child in the nation.

•

- A recent survey of 33,537 irrigation wells in the high plains area of Texas shows that 46 percent use liquefied petroleum gas, 35 percent run with natural gas, and the remainder operate with gasoline, diesel fuel, or electricity.

•

- One out of every four floor furnaces sold in America last year was built to operate on liquefied petroleum gas.

•

- The six busiest airports in the United States are paved with petroleum asphalt. Ranked according to volume of operations, they are: Chicago's Midway, New York's La Guardia, Washington's National, Los Angeles, San Francisco, and Miami.

•

- A petroleum refinery is almost a city within itself. It has its own water supply, electricity, and natural gas for fuel. It also has its own fire department, medical department, and maintenance staff.

•

- A medium-power turbo-jet aircraft engine burns its own weight of petroleum fuel every twenty minutes.

Slopover less likely in large tanks . . .

FIGURE 1—Chances of slopover from foam application are smaller in large tanks. This 30-foot diameter tank had burned 30 minutes before foam was applied.

Than in smaller ones . . .

FIGURE 2—Here a drum contains the same type of crude as in larger tanks. It was allowed to burn only 20 minutes before foam was applied, yet it slopped over.

Fire Fighting Fundamentals

Air Agitation Controls Crude Tank Fires

High flashpoint crude fires can be extinguished by air agitation alone if it is used before the heat wave reaches a critical depth. Air, cold oil or gas agitation makes control of other fires easier by cooling down the burning surface before foam is applied.

By J. L. RISINGER
Maplewood, N. J.

A LARGE CRUDE OIL tank is located about eight miles from a refinery. Water and foam are available at the farm but no personnel is available except at intervals. The tank farm is large and some of the tanks are of composition or wood roof construction and therefore not lightning proof. The tanks do not have lightning protection.

The farm is not equipped for air agitation. Should a fire occur, it will be from 1 to 2 hours before fire fighters arrive with proper fire fighting equipment. By this time, the heat wave will be from 18 to 30 inches in depth and slopover would occur if the foam were turned on.

Suppose the tank on fire is filled to capacity, or near so. *What can be done?* The following procedures are suggested:

1. The first to arrive must call the superintendent and the refinery.
2. If he arrives over 30 minutes after ignition, he should not turn on the foam but start pumping out.
3. If personnel and facilities are available, start hose streams on shell of tank above liquid level as soon as possible, allowing some water to drain very sparingly over the tank but not enough to cause slopover. Also, paint a stripe of heat detecting paint on tank from above liquid level to the bottom.
4. When ready to apply foam, reverse and pump in at the highest rate possible until flames come down or for at least three minutes. Even if complete con-

trol is not established, the heat wave may be rolled into the quantity of oil so that foam can be applied without slopover.

5. Clear personnel from near shell of tank and start foam. As foam starts, gradually cut down on pumping rate and then cut out pumping entirely. This will allow foam to spread uniformly.
6. If pumping out is through swing line, lower suction to bottom of tank when pumping out and if suction becomes blocked, pump in to open it up. When pumping in to agitate, raise suction to within about one foot of surface for best results.
7. If pumping-in rate is low and a portable air compressor is used (but not of capacity to do the entire job), use air as auxiliary to pumping in, through the same line, water drawoff or other connection.
8. If tank is equipped with mixers, use them alone if pumping in is not possible. Otherwise, use them as auxiliary to pumping in when foam is ready.
9. If tank has only a few feet of oil in it when ignited, start pumping in as soon as possible to cool down the heat input and assist in saving the tank shell.

Proper Crude Tank Fire Protection Calls for Close Adherence to the Following Seven "Rules-of-Thumb":

1. Before the fire occurs, know the characteristics of the crude oil stored in your tanks and especially those which might become ignited—what facilities are available to control and extinguish the fire.
2. If foam is to be used to extinguish a cone roof crude tank fire:
   a. Apply at required rate before heat wave of slopover depth has been established.
   b. If slopover heat wave depth has been established, cool it out or stir it in before applying foam. It can be stirred in by air agitation, pumped in or a combination of both, at least until the heat wave has reached a one-fourth depth of the oil. It may be best to withhold agitation until just prior to application of foam especially if the crude oil has a low heat wave rate.
3. At all times when fighting a crude oil tank fire, use precautions against burns from slopover or boilover. Plan procedure carefully and deliberately.
4. In smaller tanks where non-water base agent is to be used to extinguish the fire, heat wave characteristics are of no consequence.
5. In the case of small tanks where foam will not arrive for a considerable length of time, plan to extinguish with dry chemicals or other agent that does not have a water base.
6. Make use of heat detecting paint to determine the depth of the heat wave on crude oil tanks that have burned for a period of time from open surfaces before agitating the tank or applying foam.
7. If tank containing crude oil with heat wave establishing characteristics has burned from open surface for a period of thirty minutes, assume that the heat wave is of slopover depth.

Types of Crude Oil Fires—Of first importance to control and extinguishment is knowing the characteristics of the crude oil at a particular location. Simple tests will provide this information.

There are two kinds of crude oil fires: Uncontained and contained oil and gas fires — and the contained oil fire.

Uncontained crude oil fires are fought in the same manner as uncontained product fires, in accordance with the flashpoint of the crude. These running, spewing, or dropping from an elevation low flashpoint fires have to be extinguished by:

- Cutting off the source of flame.
- And/or reducing the air in the vapor-air mixture and throwing it out of the burning mixture ratio.

High flashpoint, uncontained fire can often be extinguished by cooling and thus reducing the vapors below the required volume percentage.

The *contained* fire in which the oil is trapped in a tank or pool is the one in which the crude oil displays its special characteristics of establishing a heat wave and slopping or boiling over.

Some still have the idea that a crude oil tank fire cannot be extinguished. However, extensive tests and research prove that this fire cannot only be controlled, but also extinguished.

It is to be remembered that fire will not continue to burn inside a closed tank. However, coke ignited by iron sulfide might smolder for a considerable time. Therefore, to have a tank fire, part or all of a roof must be removed or ruptured by vapor pressure or an explosion in the vapor space. This enables the entrance of air to support combustion.

The following are various methods of crude tank fire control:

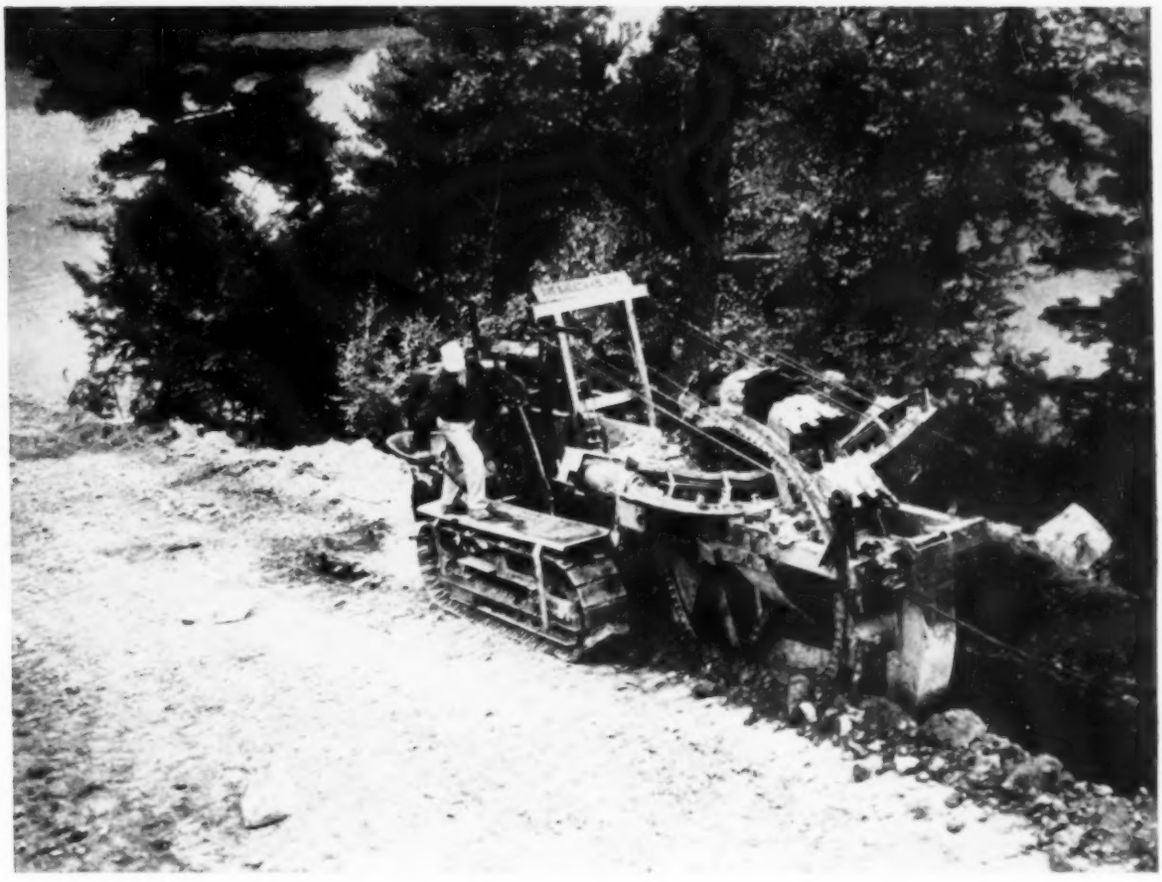
Air Agitation—In the case of high flashpoint crude oil, the air agitation method alone will extinguish the fire if applied before the heat wave is of sufficient depth so that when it is stirred in, the temperature of the oil is raised to above its flashpoint.

Air agitation alone cannot be depended upon to extinguish a low flashpoint crude oil tank fire. In some tests however, crude oils with a low flashpoint but with a vapor pressure below 1 pound per square inch were extinguished by air agitation alone before a heat wave had been established.

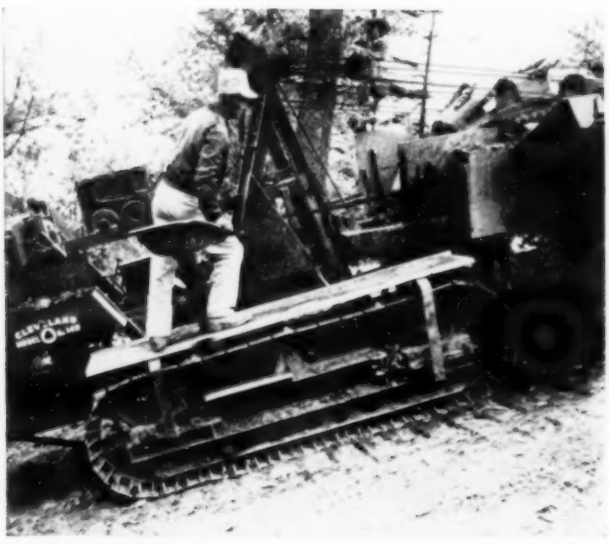
Use of Foam Without Slopover—If a large crude oil tank fire can be attacked within twenty to thirty minutes after ignition, depending upon the heat wave rate of the crude oil, there is not much danger of foam causing a slopover. This is a special case in which it is important to know in advance the heat wave rate of the oil.

In a recent test, a 30-foot diameter, 30-foot high tank filled to 25 feet in depth with Mid-Continent crude oil had burned for 30 minutes before the foam was applied. This oil with a 30 percent gasoline content and vapor pressure of above 5 psi had a rapid burn-off rate, but a heat wave rate of only about 14 inches per hour at first.

Due to the excessive quantity of light ends that had not yet burned off, the temperature of the 7-inch heat



Cleveland 140 digs through rocky New Hampshire hills



"...exceeds wildest expectations"

"We got trench with our Clevelands where we thought it would be impossible," says H. J. Burns of Hallen Construction Co., Island Park, N. Y., about a recently completed pipeline job for the Granite State Transmission Co., between Exeter and Somersworth in the rugged New Hampshire hills. The Hallen spread cut through numerous swamps and terrain strewn with boulders and choked with frequent outcroppings of rock.

"Our Cleveland 140 cut 24 miles of our 30-mile section —dug everything except the deepest swamps and solid ledge rock. It dug through shale and even handled boulders up to 6 and 8 cubic yards. Even in the toughest going the 140 never fell below 1,700 feet of trench per day and averaged 2,200 feet per day for the whole job."

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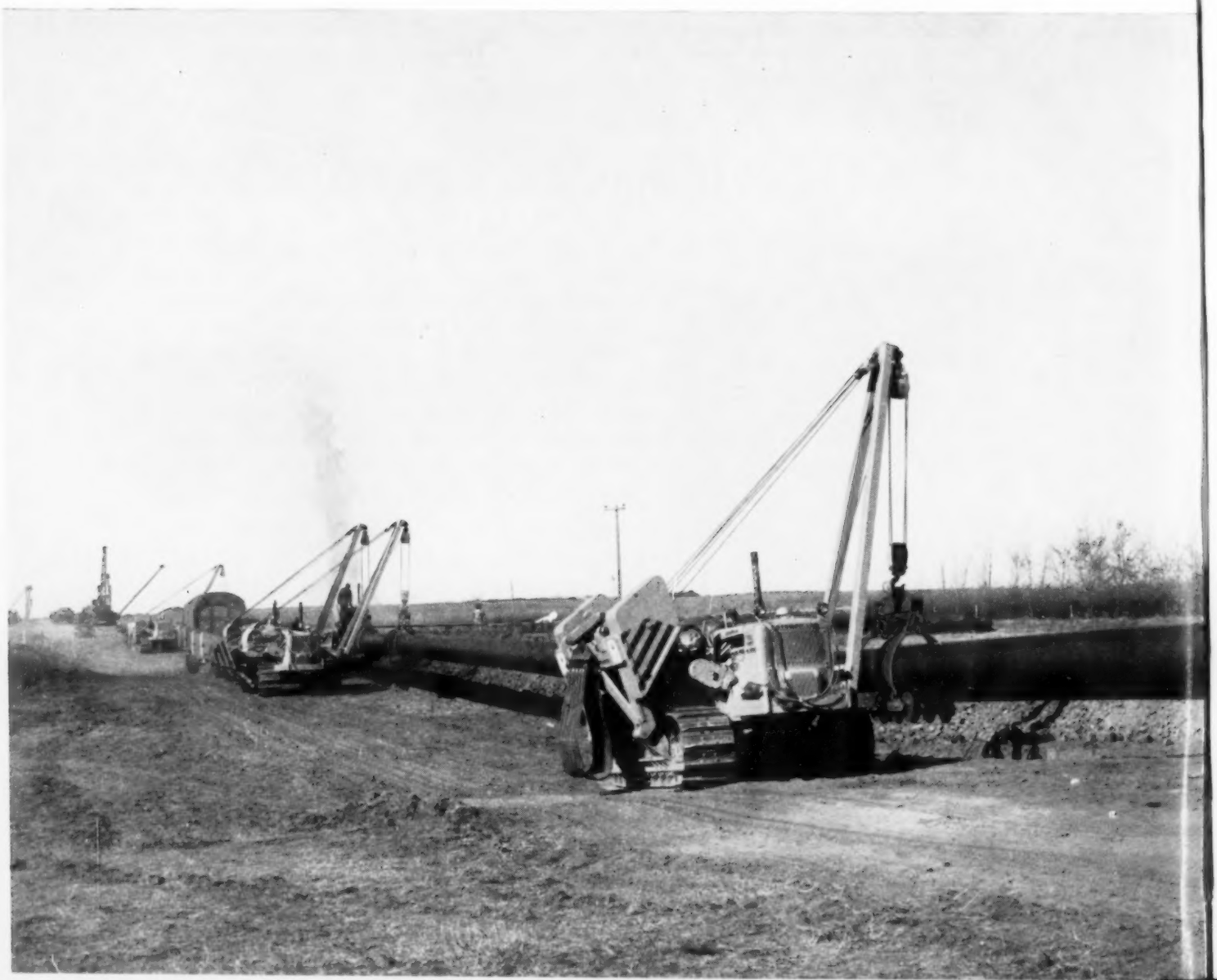
CATERPILLAR

Pushing through the world's longest pipeline

With 35 Caterpillar-built units in its spread, Majestic Contractors, Ltd., is laying 34-inch at a pace usually reserved for smaller pipe

Seven Cat No. 583 Pipelayers are helping Majestic Contractors, Ltd., lay 1½ miles of 34-inch pipe a day on the Trans-Canada pipeline.



No. 12 Motor Grader and two D7s are used on backfilling operations. The spread includes 35 pieces of Caterpillar equipment—engines, pipelayers, tractors and motor graders.

A Cat D339 Diesel powers this Cleveland ditcher in Saskatchewan. There are nine rugged, heavy-duty Caterpillar Engines at work in the spread.

When finished, the Trans-Canada pipeline will be the longest in the world. It will slash 2,500 miles across Canada, bringing Alberta gas as far east as Montreal.

Majestic Contractors, Ltd., of Edmonton, Alberta, is laying a 100-mile section of the pipe from Burstall to Leinan, Saskatchewan. It is putting the 34-inch pipe into the ground at an average rate of 8,700 feet per day. This equals the rate that smaller big-inch pipe is being laid elsewhere in the industry. In one record 10-hour working day, Majestic welded 305 joints of 40-foot-length pipe.

Spread No. 1, which is setting this pace, is practically all Caterpillar. It includes seven new CAT* No. 583 Pipelayers, the highest capacity machines in the industry; five MD7 Pipelayers; seven D7s; three D6s; two D4s; one D2, and a No. 12 Motor Grader. And Majestic is relying on nine rugged, heavy-duty Caterpillar Engines to power other equipment. There are seven D318s, one on a Cleveland backfiller and six on Bucyrus Erie shovels. In addition, there are two D339 Diesels on Cleveland ditchers.

Right-of-way is 65 feet. The ditch measures 52 inches at the bottom and 90 inches at the top. This is widened to 8 feet, 4 inches in sandy terrain. Here the No. 583 Pipelayers stay 10 to 12 feet from the 6-foot-deep ditch to lower the 150-pound-per-foot, 34-inch pipe. All pipe is being cradled in immediately following the doping and wrapping operations.

You can look for the production record on this job to become increasingly common in the industry as new No. 583s join more and more spreads. This is the highest capacity pipelayer in history, and it is establishing a new standard for a day's work. This efficient pipelayer can lift 130,000 lb. and its engine delivers 191 HP. And because of its well-balanced design, it is as safe as it is fast.

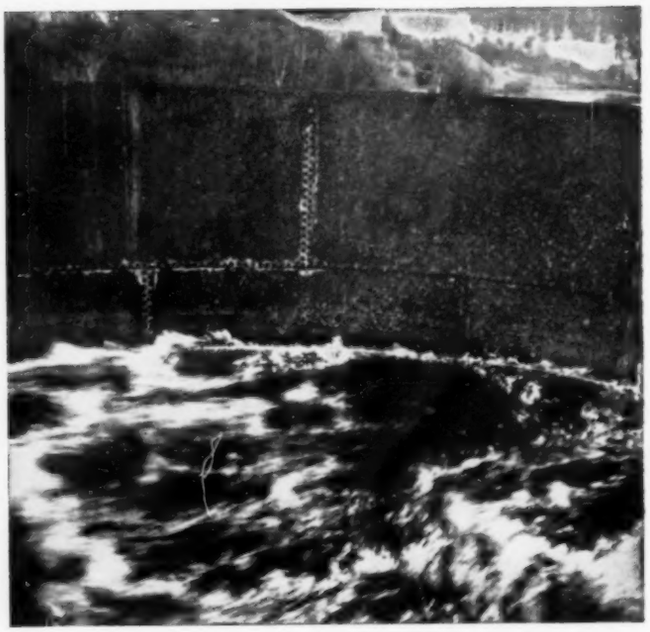
In the complete line of Caterpillar* oilfield machines and engines, there is a unit to fit every need. So call your Caterpillar Dealer soon. He will demonstrate any of his high-production machines on your job—at your convenience.

CATERPILLAR TRACTOR CO., PEORIA, ILLINOIS, U. S. A.

*Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

Without air agitation . . .

FIGURE 3—Surface of crude burns fiercely in a 30-foot diameter tank before the application of air agitation.



With air agitation . . .

FIGURE 4—This picture was taken from the top platform of tank (left) after flames were reduced by agitation with 80 cubic feet of air per minute.

wave was calculated to be about 300° F.

Figure 1 shows that when foam was applied, the heat wave did not expand to a greater capacity than the outage of the tank and there was no slopover. Tanks less than 20 feet in diameter, due to the heat input from the shell above liquid level, may establish a slopover heat wave in less time than a larger tank. In drums, crude oils with average heat wave rates will have established a slopover depth heat wave in 20 minutes. (See Figure 2)

If the crude oil tank, regardless of size, has burned for twenty minutes or more, a quick stroke of heat detecting paint will tell how deep the heat wave has penetrated. Nine inches of heat wave in any container provides great possibility of slopover depending upon the nearness of the surface of the oil to the top of the tank and the viscosity of the oil.

It is difficult to establish a safe heat wave depth prior to which foam can be applied without slopover. This would depend upon the height of shell intact above liquid level, viscosity of the oil and the rate of foam application. However, where crude oil tank fires can be attacked with foam within a short time after ignition, they can be extinguished without slopover.

When fighting a crude oil tank fire with foam and if water stream is available, give it a shot at one spot near one side of the shell. If mild slopover occurs, delay application of foam until heat wave can be cooled or dissipated. If foam is applied before an appreciable heat wave is established, air agitation will reduce the flames and the amount of foam required to extinguish the fire (See Figures 3 and 4).

How to Reduce Heat Waves — There are several ways to break up a heat wave of slopover depth and thus prevent a slopover when foam or water is applied.

The old method of cooling out a heat wave before application of foam works part of the time. This method consists of raining water into the heat wave by use of hose nozzle, thus causing a mild slopover which is extinguished with the same hose. This operation is continued until it is considered safe to apply foam. The method takes a long time and usually fails due to impatience and putting foam on too soon.

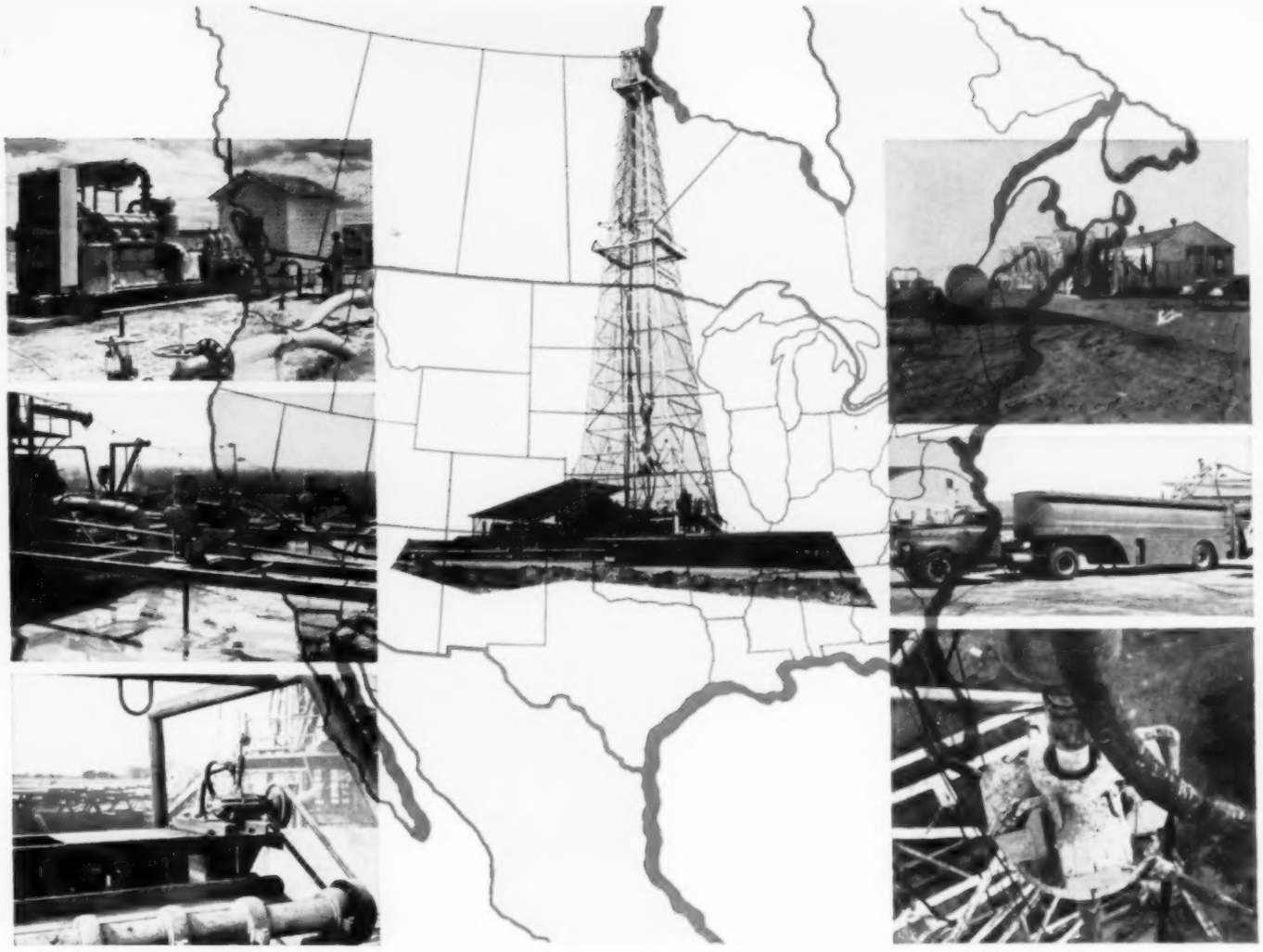
If water is available it should be applied to the shell above the liquid level as soon as possible to prevent it from buckling. Usually, after about ten minutes burning in a tank over 20 feet in diameter and with a 4 or 5-foot free-board, the shell will start to buckle.

Air agitation will reduce the heat wave by stirring it into the quantity of oil. This method is effective up to the time the heat wave has progressed to one-fourth the depth of the oil. Beyond this depth, stirring the heat wave may raise the temperature of the oil above the boiling point of water. In this case (if there is water in the bottom of the tank) a boilover will begin.

If there is no water in the bottom of the tank and the oil temperature is raised above the boiling point of water, a mild slopover may occur when the foam is applied. If good control can be established, the flames will be brought down and less foam required.

In Figure 5 the small crude oil tank has burned to a heat wave depth of approximately one-fourth the depth of the tank so that when foam is applied, the tank slops over. In Figure 6 the same size tank containing the same kind of crude oil has been allowed to burn until the heat wave depth is approximately one-fourth the depth of the oil. But in this case the oil has been agitated with air. When foam is applied no slopover occurs.

Use of Gases and Cold Oil — It is to be kept in mind that in the method of air agitation, air performs the function only of rolling the cold oil to the surface. Inert gas and even flammable dry gas has been used suc-



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Slopover occurs when foam hits hot oil . . .

FIGURE 5—Small crude oil tank has burned to a heat wave depth of about one-fourth of the tank depth. When foam was applied, the tank slopped over.

But not when cooled by air agitation . . .

FIGURE 6—The same tank containing the same kind of crude oil having a heat wave at the same depth was agitated with air. It did not slop over when foam hit the cooler surface.

cessfully in tests to perform the same function. Flammable gas, such as light field gas, can be used but caution should be taken not to use a gas that is simply absorbed by the oil and thus adds more light ends.

A few small tests have been run using the pumping of the same oil, circulating and thus stirring the oil. If sufficient pumping in rate is available, cold oil can be rolled to the surface and may effectively stir in and cool a heat wave of greater depth than can be handled with air agitation.

Since but few tests have been made on this method, a detailed description of one example is presented here:

In this test, the tank was 5 feet in diameter and 57 inches high. The tank was filled to within 11 inches of the top with a sour crude mix. This crude had flashpoint below 0° F., an initial boiling point of 146, a vapor pressure above five pounds per square inch and an API gravity of 31.5. Although its final boiling point was 900° F., the quantity of lighter ends was in large proportion to the total mixture. Distillation was as follows:

IPP	—	146 F.
10%	—	228 F.
20%	—	308 F.
30%	—	388 F.
40%	—	488 F.
50%	—	594 F.
59%	—	650 F.

Plans were to burn the tank to a one-fourth depth of heat wave, circulate the oil out of the bottom and back into the tank to agitate the heat wave into the total contents of the oil.

After an hour's burning, it was observed that the burn-off was about ten inches. The heat wave had traveled a distance of 18 inches below the liquid level, or to approximately 3/8 of the depth of the oil. It was calculated that only part of the light ends were removed and therefore the heat wave was about 300° F. temperature so that when stirred in, the temperature of the total quantity of oil would not be over 195° F.

At this time, the circulating pump was started. No attempt was made to greatly reduce the flames, but only to stir in the heat wave. Due to the remaining light ends, foam had to be applied at a fast rate to extinguish the fire. Although there was a small amount of froth at the surface, no slopover occurred.

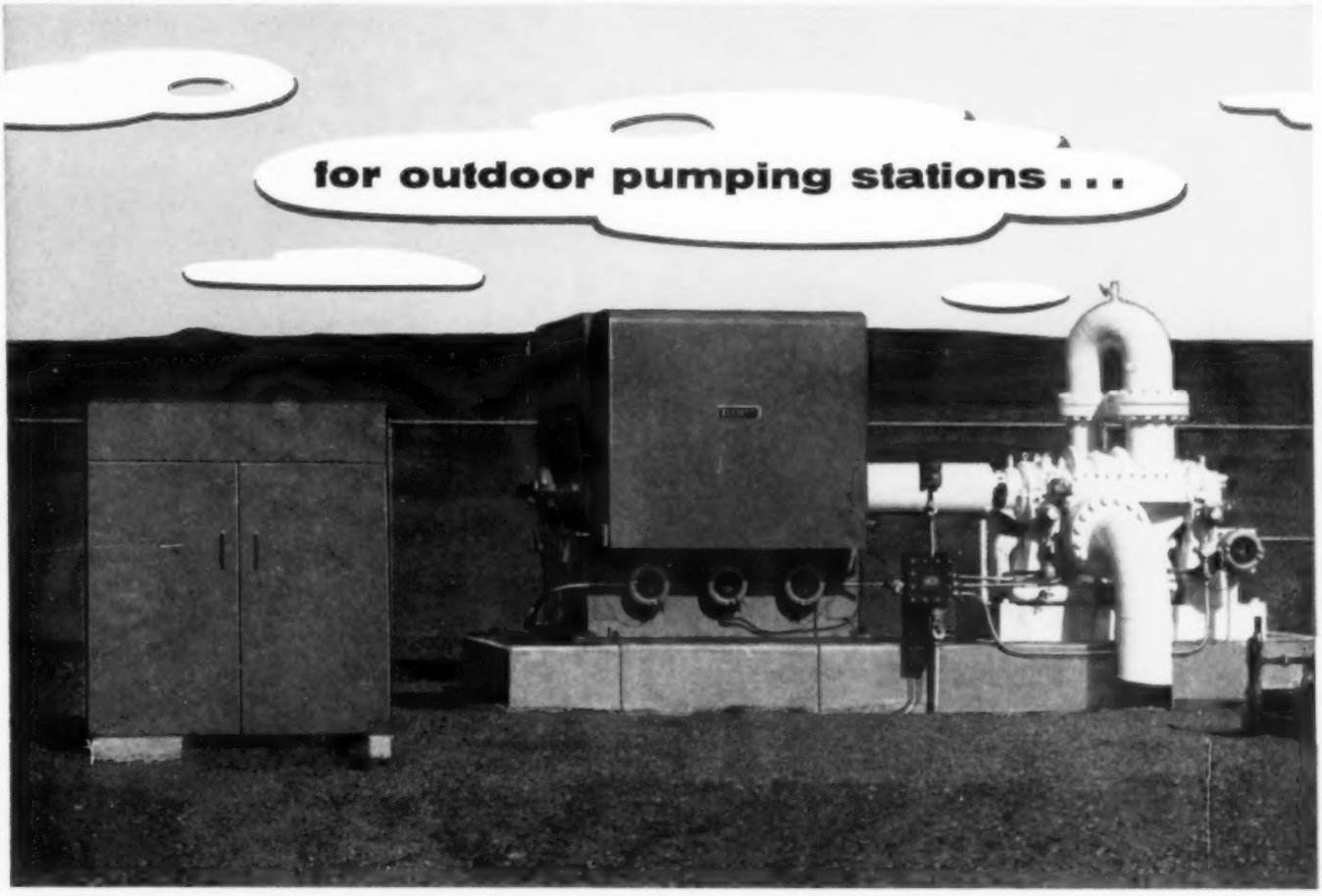
Temperature Is Important — In addition to facts learned about the new method, the significance of the temperature of the heat wave was emphasized. If the light ends had been completely burned away or the oil had contained but few or none of them, the temperature of the crude oil would have been raised to above the boiling point of water and a slopover would likely have occurred when foam was applied.

There are other unexplored methods of extinguishing crude oil tank fires. For example, suppose there is nothing available except water and the tank has burned for a long time. In this case it may be possible to use hose streams to cool and cause some froth but yet not enough to cause a violent slop. The fire may be extinguished with judicious use of water stream alone. This has been done on small tests.

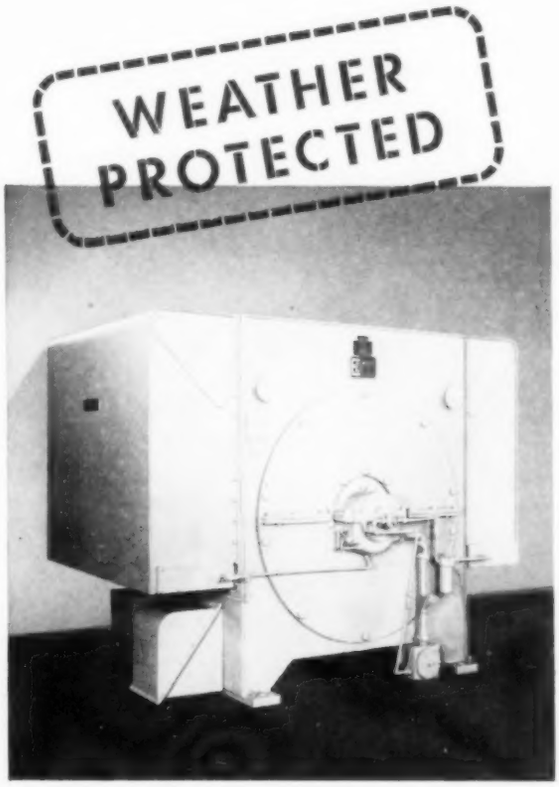
It is well to consider all of the methods available for extinguishment of crude oil fires. However, in the final analysis, the best way to extinguish fires is to prevent them and the best way to prevent them is to store crude oil in all steel, gas-tight, adequately vented, cone roof tanks or correct floating roof tanks. Then maintain the tanks properly.

If this is done and certain minor precautions are observed with respect to such items as iron sulfide, the problems of fighting crude oil tank fires will become practically nil.

This is the second article in a series covering Fire Fighting Fundamentals. The first appeared in the February, 1957 issue of PIPE LINE INDUSTRY.



no enclosures or special foundations needed with **ELLIOTT PIPE LINE MOTORS**



Through the use of Elliott Weather-Protected Motors, pumping stations are greatly *simplified* without sacrificing *dependability*. In the station shown above, an Elliott 1500 hp 2-pole 3600 rpm squirrel cage induction motor is direct connected to a two-stage oil pump. This motor is specially designed for pipe line service, and is so completely weather-protected that no special house or enclosure is required.

The motor bearings are flood-lubricated by a self-contained system which includes a geared pump, oil filters, and an air-to-oil cooling system within the motor housing. Temperature detectors protect both bearings and motor windings. Space heaters inside the motor enclosure are energized when the motor shuts down, thus preventing condensation of moisture. Relays and controls are protected by glass-covered explosion-proof enclosures.

Based upon their satisfactory experience with weather-protected motors, this company has standardized on the simplified outdoor pumping stations rather than the more costly enclosed stations.

For further details, write Elliott Company, Ridgway, Pennsylvania, or consult your nearest Elliott District Office.

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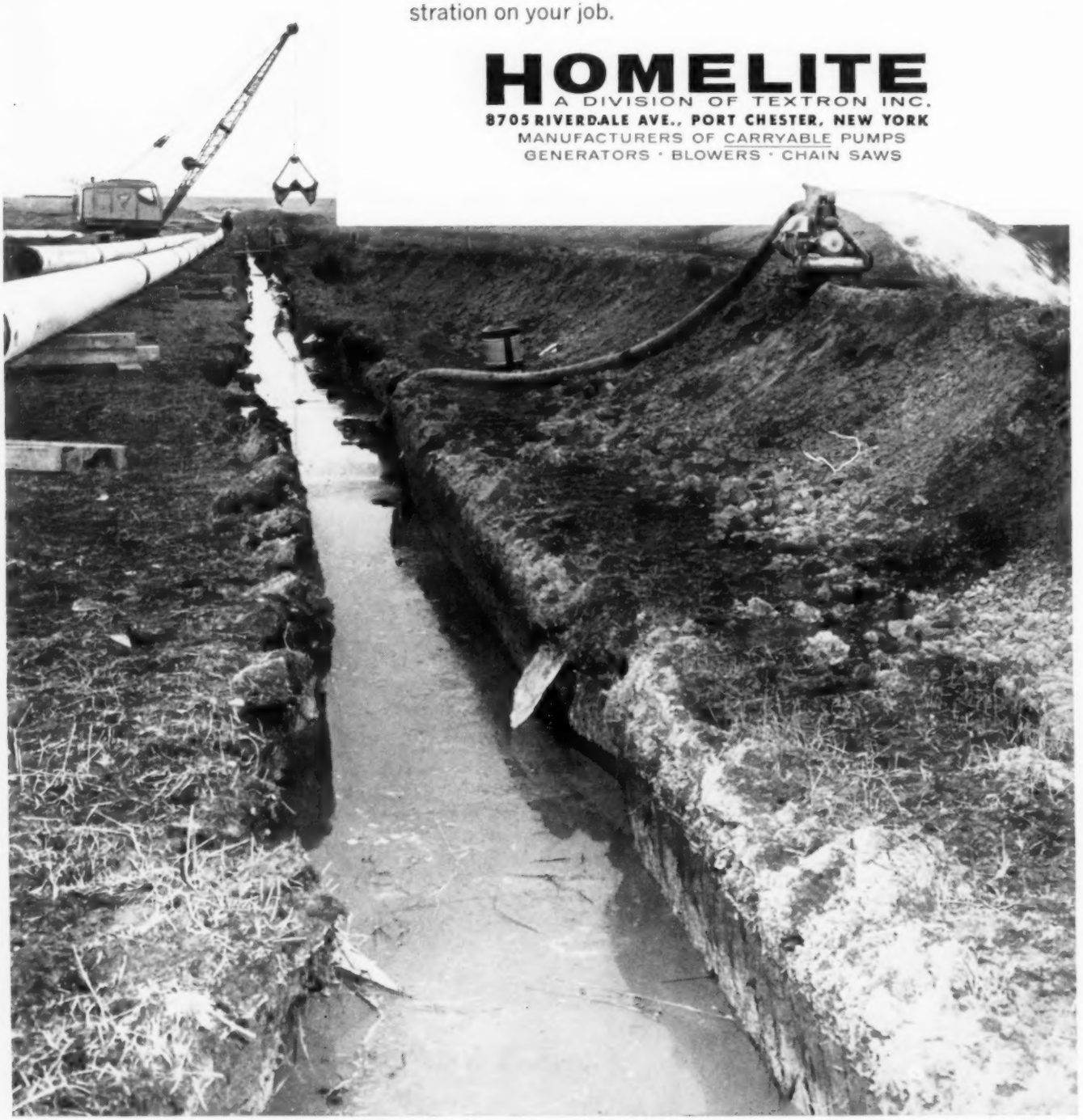
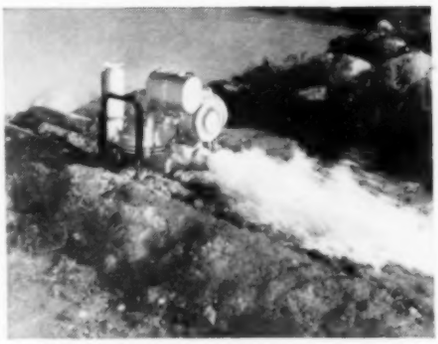
Out it Goes, Fast

When water comes, get rid of it fast . . . to get men back to work . . . to save money on the job. Do it with a Homelite Carryable Pump. It's quick getting to the job. It's quick getting the job done. Fast self-priming. 28 foot suction lift. Pumps up to 15,000 gals. per hour. Gets water right down to strainer level and keeps seepage at that point automatically. Self-cleaning design handles muddy or sandy water without clogging. Write or call for a demonstration on your job.

HOMELITE
A DIVISION OF TEXTRON INC.
8705 RIVERDALE AVE., PORT CHESTER, NEW YORK
MANUFACTURERS OF CARRYABLE PUMPS
GENERATORS · BLOWERS · CHAIN SAWS

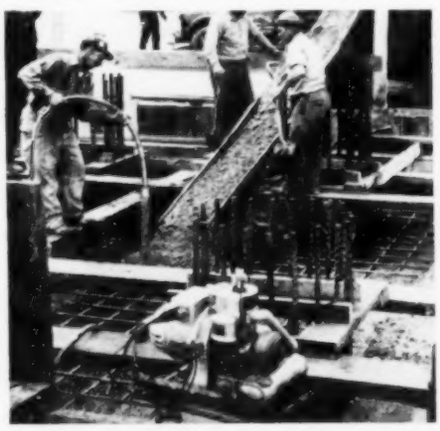


Full Line of Carryable Construction Equipment Now Offered by Homelite



Carryable Diaphragm Pump . . . This self-priming, 120 pound diaphragm pump will handle water in the thickest sand, muck, or mud. Capacity: 5,000 g.p.h. Size: 3". Complete line of centrifugal pumps are also available in sizes from 1½" to 3".

Chain Saws For Every Job . . . Now you can choose from a full line of lightweight, powerful Homelite chain saws. From 3½ to 7 horsepower . . . 19 to 29 pounds. Brush cutting and clearing attachments are available to handle all your cutting jobs.



One-Man Electric Vibrator . . . It takes only one man to place concrete with powerful, Homelite high-cycle or universal electric concrete vibrators. Carryable Homelite generator provides power for high-cycle vibrators *and* 110 volt DC for all universal vibrators, tools and floodlights.

HOMELITE

a division of Textron Inc.

PORT CHESTER, NEW YORK

WHAT'S HAPPENING IN PIPE LINE CONSTRUCTION

Natural Gas Pipeline Proposes $62.7 Million System Expansion

Natural Gas Pipeline Company of America, a subsidiary of Peoples Gas Light and Coke Company, has announced plans for a $62.7 million expansion project to increase the daily delivery capacity of the system by 185 million cubic feet.

Natural Gas Pipeline will construct 337 miles of 30-inch loop line between the company's terminus in Texas and Beatrice, Neb. A 59-mile 36-inch line will be built between Beatrice and Joliet, Ill. When completed, the project will add a third parallel line along the dual 24 and 26-inch lines now operated by Natural Gas Pipeline.

The new project, for which Federal Power Commission authorization is asked, is in addition to the company's current expansion program now pending before the FPC.

The combined effect of these separate expansion plans will be to increase by 670 million cubic feet the present delivery capacity.

The $62.7 million investment in the new project, along with the $76 million earlier proposal, and other pending expansion plans for all the Peoples Gas Light and Coke companies, will cost $210 million.

A substantial amount of the 185 million cubic feet of additional gas will come from the company's new pipe line extension from Jack and Wise Counties, Texas, to the main line at Fritch, Texas, a project approved by the FPC several months ago.

Other sources in the Texas Panhandle and in Oklahoma, will pro-

California Line Progresses

Construction crews lower 34-inch pipe on a 28-mile stretch of Pacific Gas & Electric Company's loop line in mountainous country south of Mendota, Calif. The project is a joint venture of Midwestern Constructors Inc. with Johnson & Dixon Companies to loop 88.5 miles of PG&E's "Super Inch" line from Topock, Ariz., to San Francisco Bay area.

For more data on advertised products, use Readers' Service Cards, last page.

vide the balance. Lone Star Gas Company, largest of these suppliers, will deliver up to 100 million cubic feet a day to the extension line in Oklahoma. There will be 29,750 increased compressor engine horsepower in stations along the main line from Fritch to Joliet.

Delivery date for the new project is the 1959-60 winter season. The current 485 million cubic feet expansion is scheduled for completion for the 1958-59 season.

Transco Receives Approval For New Compressor Facilities

Transcontinental Gas Pipe Line Corporation has received authorization from the Federal Power Commission to contruct and operate $4.8 million natural gas facilities in Texas and Louisiana.

Transco will build a 880 horsepower Mission Valley booster station in Victoria County, Texas; an 880 h.p. booster station and dehydration station in Luby field, Nueces County, Texas; and an 880 h.p. booster station, dehydration station and purchase meter in Greta field, Refugio County, Texas.

The authorization also includes installation of additional horsepower at stations in Harris County, Texas, and Beauregard Parish, La.; construction of a 10-inch lateral supply line in the Greta field, and construction of a 2200 h.p. compressor station in Nueces County.

May Completion Date Set For Northwest Jet Fuel Line

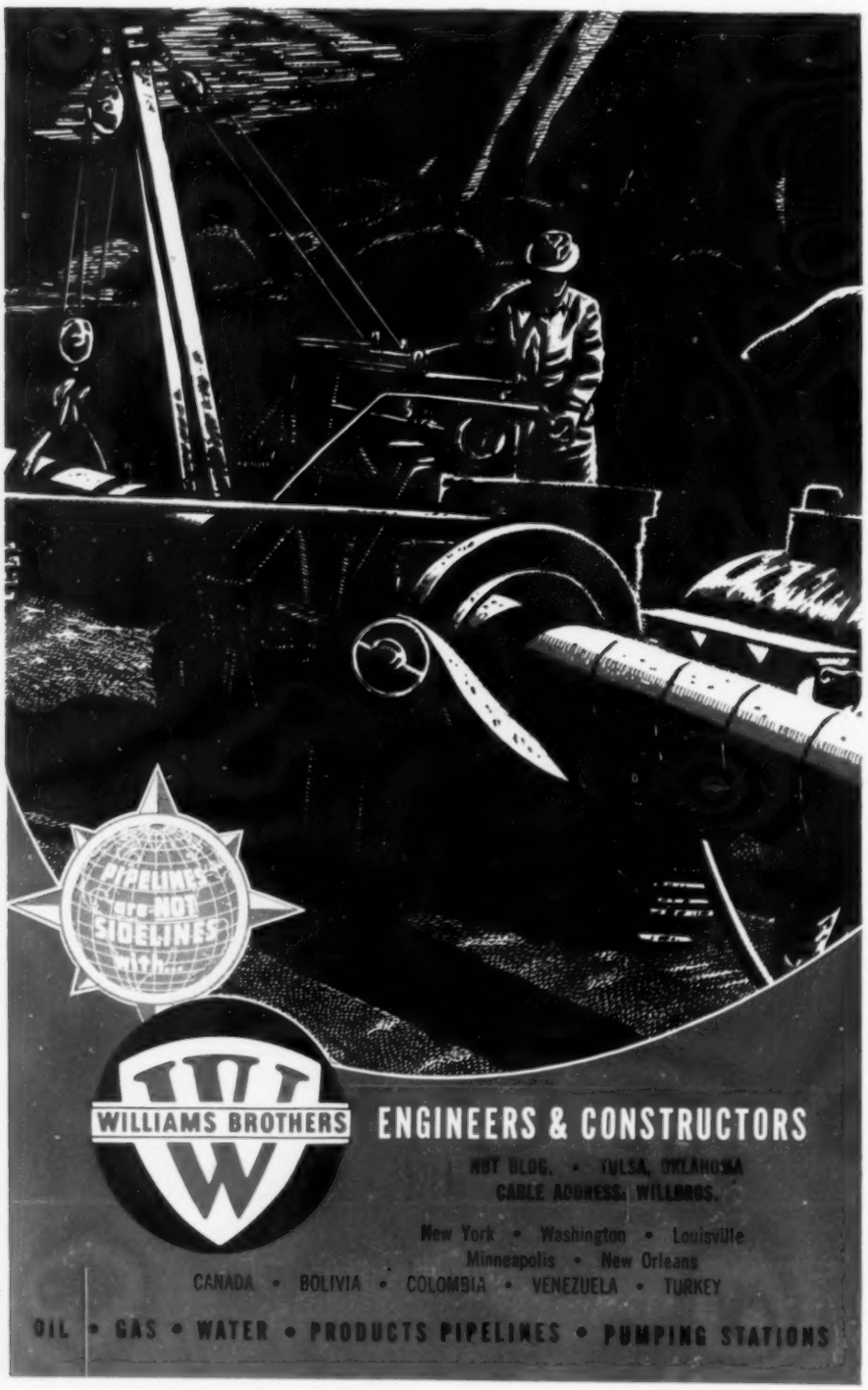
A $810,000 jet fuel pipe line is scheduled for completion this month. The 8-inch line extends 25 miles from the Spokane, Wash. delivery facilities of Yellowstone Pipe Line Company in the East Spokane area to the Geiger and Fairchild Air Force Bases.

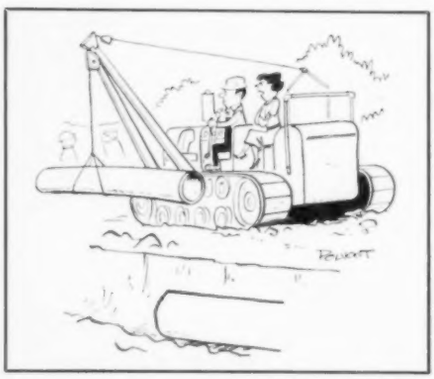
An extension of the 540-mile Yellowstone line from Billings, Mont. to Spokane, the line is being constructed by Engineers, Ltd. Pipeline, San Francisco and Seattle, under the supervision of Yellowstone Pipe Line Company engineers.

Survey Contracts Awarded For Utah, New Mexico Line

Two firms received contracts to begin the immediate survey of Texas-New Mexico Pipe Line Company's 517-mile crude oil pipe line route from the Aneth field, San Juan County, Utah, southeastward to Jal, N. M.

J. V. McCoy of Houston will survey a 256-mile portion of the route from the Aneth field to a point near Moriarty, N. M. E. H. Schmidt and Associates of Tulsa will survey the remaining 261 miles from near Moriarty to Jal. Completion of the survey is expected in early summer.





Pipe Line Industry

"Now lower the pipe a little—watch out for that rock—not so fast."

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On more transmission lines and in more refineries than any other valve control

LimiTorque is the most widely used automatic valve operator in the World . . . Thousands are operating day and night, on Pipe Lines, and in Refineries, from Saudi Arabia to Canada. The wide preference for LimiTorque stems from proven performance under all service and climatic conditions: heat, cold, dust, fumes, sleet and rain . . . For all types of pipe line or refinery valves . . . LimiTorque can provide just the right control.

There is no guesswork or labor connected with the LimiTorque Valve Controls . . . from a conveniently located control point, one key man can open and close any type of valve quickly and dependably in remote or hazardous locations. Thus, vital pipe line and refinery operating procedure can be handled easily and safely. Also, LimiTorque provides protection from valve damage during closing due to the unique torque limiting mechanism.

LimiTorque may be actuated by any available power source, such as Electricity, Oil, Gas, Water or Air; and is now available for Microwave control.

Send for Catalog L-550 for details.

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INDUSTRIAL GEARS & SPEED REDUCERS • LIMITORQUE VALVE CONTROLS • FLUID MIXERS • FLEXIBLE COUPLINGS

Limitorque Corporation • Philadelphia

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Construction men fought terrain and bitter cold in the construction of PNW's "scenic-inch" pipeline.

Why communications have to be good on Pacific Northwest's "scenic-inch" line

Pumping gas over mountain passes across 1487 miles of America's toughest terrain requires the most reliable communications available.

Pacific Northwest Pipeline Corp. presented this requirement to the Bell System, with one additional request—economy.

The result is a private line telephone system that PNW's Salt Lake City control center uses to keep a running summary of conditions along the line. Information gathered in Salt Lake City from each compressor station includes dew point, BTU content and specific gravity of the gas. Dispatchers use this data as guidance in controlling flow.

. . .

Bell System communications can work for you as fast and reliably. Just call your Bell Telephone Company business office. A representative will gladly discuss your requirements.

Pacific Northwest's Salt Lake City dispatchers collect data hourly from every compressor station and maintenance point on the company's 1487-mile pipeline.

BELL TELEPHONE SYSTEM

PRIVATE LINE TELEPHONE • PRIVATE LINE TELETYPEWRITER DATA TRANSMISSION SYSTEMS • CHANNELS FOR: REMOTE METERING AND CONTROL • TELEPHOTOGRAPH • CLOSED CIRCUIT TV

Burden Awarded Contract For Tecumseh Pipe Line

The O. R. Burden Construction Company of Tulsa, Okla. will construct Tecumseh Pipe Line Company's 20-inch crude line between East Chicago, Ind., and Cygnet, Ohio.

Work will begin immediately on the 200-mile line which will supply 100,000 barrels of crude daily to expanding refinery markets in Ohio, Michigan and New York.

Pipe is already in production, some en route and more is scheduled for delivery to unloading sites within the next month. Construction offices for the project are located at Elkhart, Ind.

Ashland Oil & Refining, Pure Oil Company and Sinclair Pipe Line Company own the capital stock of Tecumseh. Sinclair will supervise the construction and will operate the completed system.

Plans call for Tecumseh to pick up crude from trunk lines terminating in the Chicago area and transport it to Cygnet where it will tie in with the Buckeye Pipe Line and other carriers moving north and east.

Sinclair and Pure reportedly plan to move additional crude into the Chicago area through their system from Cushing, Okla.

Two proposed pumping stations on the Tecumseh line will eventually bring the capacity of the Tecumseh line to 170,000 barrels per day. A single station to be constructed at Hartsdale, Ind. will power the line initially.

Burden is moving two spreads onto the line to handle two sections of 93 and 92 miles. Burden's contract includes 185 miles, all but 16 miles on the western end. Pipe laying should be completed in approximately three months and crude is expected to be moving in September.

Great Northern Railway Plans Williston Basin Line

The Great Northern Railway is considering the construction of a pipe line originating in the Williston Basin. The line would furnish a crude oil outlet in the St. Paul-Minneapolis and Duluth-Superior areas.

Pipe Line Technologists Inc. of Houston is conducting the preliminary study.

FINE, QUALITY-CONTROLLED STEEL
GOES INTO ALL
LONE STAR LINE PIPE
Never-ceasing research, inspection and multiple testing to API specifications are your assurance of Lone Star's superb quality. Lone Star controls every step of manufacture from mining of ore to the finished product. LSS line pipe is fully normalized, of course.
Neighbor, wherever you are, specify Lone Star and we both get a good deal.
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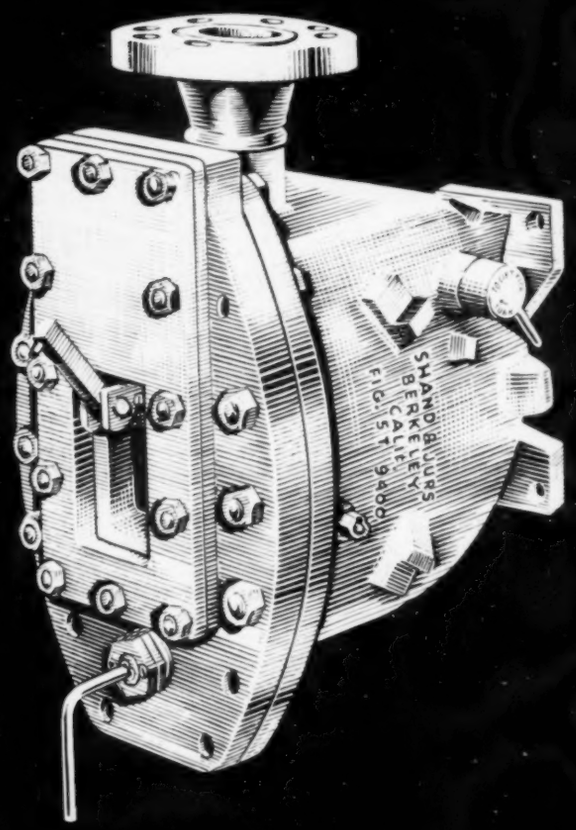
GREATER ACCURACY
in High Pressure Gaging of Storage Tanks



A NEW automatic tank gage for measuring product under pressures of from 150 to 300 pounds has just been released by S.&J. engineers, and brings new accuracy and safety to gaging tanks in which hand gaging is impossible and gage glasses are often inaccurate.

The new design incorporates a constant torque spring (Neg'ator Motor) which is an elastic member exerting a restraining force which does not increase as it is extended, giving consistent tape readings regardless of the position of the float. In addition to providing new accuracy over the entire range of float travel, this design also eliminates the conventional counterweight, with its supporting tape and housing.

This new high pressure automatic gage, identified as Fig. ST-9400 is available for both ground and roof reading. The gage includes an 18-8 stainless steel tape graduated to eighths of an inch and a tubular aluminum pressure type float as standard, with stainless steel float optional. Engineers interested in the ultimate in high pressure gaging are invited to request complete details, drawings and prices.

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MEXICO, D.F.: Dalmo Comercial, S. A.
CARACAS: Sinclair Spence, C.A., Edificio Galipan
ENGLAND: Whessoe, Ltd., Sales: 25 Victoria St., London S. W. 1
Whessoe, Ltd., Works: Darlington, County Durham

United Gas Gets Okay For Alabama Facilities

United Gas Pipe Line Company has been authorized by the Federal Power Commission to construct and operate direct service natural gas facilities costing an estimated $1.1 million.

The new facilities located near Brewton, Escambia County, Ala., include approximately 40 miles of 8-inch pipe line from a point in Baldwin County to the Container Corporation of America plant near Brewton. Metering and regulating stations will also be constructed.

Contracts Awarded on Line From Texas to Florida

Midwestern Constructors of Tulsa will construct the 950-mile natural gas pipe line of Houston Texas Gas and Oil Company extending from Baton Rouge, La., to Miami, Fla. Lateral lines and city distribution systems in Florida will be built by Harbert Construction Corporation, Birmingham, Ala.

Construction on the $94.3 million project is expected to begin this summer. Barnard and Burk of Baton Rouge are project engineers and Walco Engineering is in charge of station construction.

Houston Texas Gas and Oil's project, which includes 682 miles of laterals in Florida, joins the 574-mile proposed line of Coastal Transmission Corporation from the Rio Grande Valley in Texas to Baton Rouge. (See PIPE LINE INDUSTRY, February, 1957, page 64).

Recently Houston Texas Gas and Oil announced plans to set up home offices in St. Petersburg, Fla.

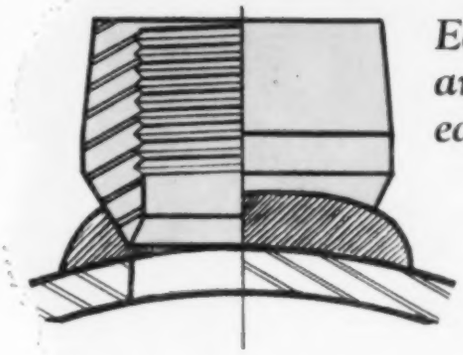
Permian Basin Pipeline Buys Facilities from Phillips

Permian Basin Pipeline Company has been granted temporary authority by the Federal Power Comission to acquire and operate compressor facilities built by the Phillips Petroleum Company.

Permian will add the two 1,350 horsepower units to their Andrews County (Texas) compressor station. The $842,800 purchase price for the facilities was determined by the estimated cost of the construction and overheads.

A New Line of Branch Connections

W-S COUPLETS



Economical and easy-to-install

Readily modified for small diameter installation

W-S Couplets are designed to function as universal outlet connections for tanks, process vessels and pipelines. They eliminate the need for large, expensive field inventories and costly delays in fabrication.

On most tank, and large piping installations they are used as received. On those few applications where attachment is to be made to a small diameter pipe, the W-S Couplet is easily modified by contouring the welding end with an acetylene torch to mate with the curvature of the pipe diameter. Couplets are made with extra length and heavy wall to permit contouring without detriment to the threaded or socket end.

W-S Couplets are available in sizes ¼" through 2", with screw-end or socket-welding dimensions ... also in a 90° elbow.

Send for Bulletin CP-1-57. Write to W-S Fittings Division, H. K. Porter Company, Inc., P. O. Box 95, Roselle, N. J.

HKP W-S FITTINGS DIVISION
H. K. PORTER COMPANY, INC.

For more data on advertised products, use Readers' Service Cards, last page.

DROP FORGED
for Strength

HOT FORMED
for Weldability

Hot formed steel is not subject to weld cracking, a chronic complaint on cold rolled products.

HEAT TREATED
All Thredolet fittings are heat treated after forging in accordance with A.S.T.M. A105.

ANTI-CORROSIVE LACQUER COATING
All Bonney fittings stay new and ready-to-use years after leaving our factory. Threads do not get clogged with grit as do oil-preserved fittings.

BONNEY

WELDOLETS ®
THREDOLETS ®
SOCKOLETS ®
BRAZOLETS ®
ELBOLETS ®

CARBON STEEL
STAINLESS
ALLOY
for all services

consider these features then specify and use BONNEY Thredolets and Sockolets for all small branch connections . . . and Weldolets for all large branch connections.

PENNSYLVANIA DIVISION
BONNEY FORGE & TOOL WORKS
ALLENTOWN, PENNSYLVANIA

Dept. N

New Pipe Line Corporation Will Construct Kansas Line

The Southern Kansas Pipe Line, Inc. has been organized recently to build a 200-mile pipe line from southwestern Kansas to Arkansas City, Kansas, where it would tie in with existing pipe lines from Texas, Oklahoma and Kansas.

The proposed project calls for a 6 to 10-inch diameter pipe line with a capacity of 10,000 barels a day. The line would require six months to build and would provide permanent relief for the pools now selling to Shamrock Oil and Gas Corp. of Amarillo, Texas, which is withdrawing from the area.

Indications are that the proposed artery may eventually cover all of southwestern Kansas and southeastern Colorado.

George H. Bruce, president of the Aladdin Petroleum Corp. of Wichita, Kansas, and R. V. Rodman, president of Anderson-Prichard Oil Corp. of Oklahoma City, are reported as the principal organizers of the new company.

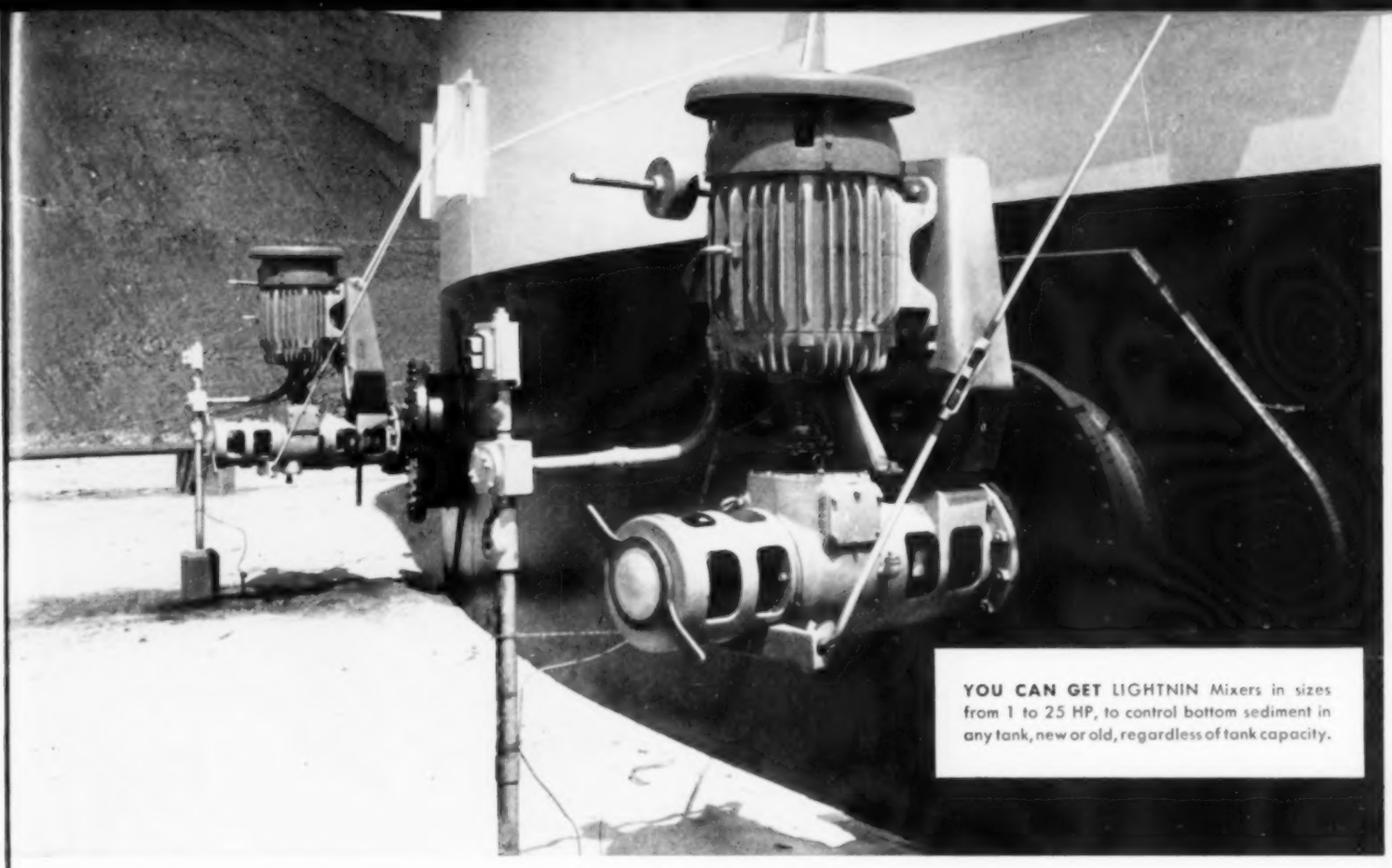
El Paso Natural Revises Project by $2 Million

El Paso Natural Gas Company has been authorized to make changes in proposed facilities to deliver an additional 75 million cubic feet of gas daily to Southern California Gas Company and Southern Counties Gas Company and an additional 75 million cubic feet daily to Pacific Gas & Electric Company. The revision will result in a saving in cost of $2.6 million.

Changes authorized in main line facilities are a reduction of 20 miles of pipe line and addition of 4460 horsepower in proposed additional compression. Changes in field facilities include reduction of 5390 compressor horsepower; relocation of the existing Largo field and Ballard field compressor stations previously authorized and the proposed Lindrith field station and transfer of 2860 horsepower from the Largo and Ballard stations to the Lindrith station. In addition 29 miles of pipe line will be built and some pipe line and compressor facilities proposed as part of the San Juan field gathering system will be eliminated.

Under the revised plan, the estimated construction cost will be $80.3 million.

For more data on advertised products, use Readers' Service Cards, last page.



YOU CAN GET LIGHTNIN Mixers in sizes from 1 to 25 HP, to control bottom sediment in any tank, new or old, regardless of tank capacity.

How to store 10% more crude *without putting up another tank*

Every time you give up an *inch* of tank storage space to settled sludge, you lose many barrels of holding capacity.

Even under normal conditions, your dead storage from accumulated BS&W can run as high as 10% of your total storage capacity.

Get full capacity

You can keep your tanks ready for maximum storage—ready to work at full capacity all the time—with LIGHTNIN Mixers.

An efficient propeller stream turns over the entire tank contents, holds heavy sludge components off the tank bottom, and keeps the crude uniform. You dispatch the *same petroleum values that you receive.*

Cut tank cleaning cost, too

You cut operating costs when you install LIGHTNINS. Careful field tests prove it. Say good-bye to costly, messy sludge cleanout jobs that keep your tanks out of service just when you need them. Instead, you keep your tanks clean by flipping a switch!

How to get started

More than 50 independent pipe line companies, 35 leading oil companies, are using this easy, modern LIGHTNIN way to boost storage capacity, cut costs. How about you? For more facts, just call in your LIGHTNIN Mixer representative (he's listed in Composite Catalog). Or write us today.

Lightnin® Mixers

MIXCO fluid mixing specialists

Get these helpful bulletins on BS&W control and LIGHTNIN Mixers. Check, tear out and mail to us today with your name and company address. Free—no obligation.

- ☐ BS&W Control with LIGHTNIN Mixers (B-503)
- ☐ Side entering mixers, 1 to 25 HP (B-104)
- ☐ Data sheet for figuring mixer requirements (B-107)
- ☐ Condensed catalog describing LIGHTNIN Mixers—all types (B-109)
- ☐ LIGHTNIN rotary mechanical seals for extra-low-cost mixing (B-111)

MIXING EQUIPMENT Co., Inc., 196-e Mt. Read Blvd., Rochester 11, N.Y.

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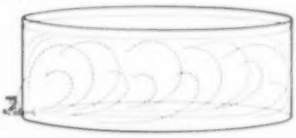
DO YOUR TANKS LOOK LIKE THIS? Settled sludge is probably costing you much more than you realize. Cleaning cost is only part of the story.



...OR LIKE THIS? You actually save money when you keep tank bottoms clean this easy way. LIGHTNIN sediment control can save you as much as $1,000 per tank per year.

Tennessee Gas Revises Plans Before FPC to Increase Service

Tennessee Gas Transmission Company has amended two applications before the Federal Power Commission for approval of natural gas facilities to increase its daily system delivery capacity by 571.7 million cubic feet.

The amendments were made to revise the sequence in which facilities previously proposed would be constructed in order to provide increased service by the fall of 1957.

TGT filed an application last October for approval of a $166 million expansion program including 1085 miles of new pipe line. (See PIPE LINE INDUSTRY, October, 1956, page 61.) TGT's proposed 1957 construction includes 175 miles of various diameter pipe line; 37,260 new and additional compressor horsepower in stations in Louisiana, Mississippi, Tennessee and Kentucky; and a submarine crossing of the Mississippi River. Costing $39.7 million, these facilities will provide an additional daily capacity of 118.1 cubic feet.

The 1958 phase of construction includes 896 miles of pipe and 83,730 horsepower in new and existing compressor stations in Mississippi, Tennessee, New York, Pennsylvania, Kentucky and Ohio costing $135.4 million. Daily delivery capacity will be increased by 338.3 million cubic feet.

A part of the project includes a line into the Gulf of Mexico to offshore wells. The FPC recently authorized four independent producers to sell two trillion cubic feet of natural gas to TGT from a gas field off the coast of Louisiana. The producers are Continental Oil Company, Tidewater Oil Company, Atlantic Refining Company and Cities Service Production Company. TGT has temporary authorization to build facilities to take deliveries of this gas into its main line system.

THE DIE IS CAST!

IT'S THE DIE-CAST ALUMINUM HOUSING FOR THE NEW TULSA® SINGLE SPEED, MEDIUM DUTY POWER TAKE-OFF!

The die-cast aluminum housing makes this NEW TULSA power take-off "light as a feather" . . . gives it all the strength and durability for which the TULSA line is famous. Output shaft rotates on two needle bearings and is manufactured in three sizes—13/16", 7/8" and 15/16". It's available with either cable or lever control. Designed and built to cover the full market range of a thoroughly dependable, low priced, single speed power take-off for medium duty work. Same nationwide distribution and service as offered for the full TULSA line of power take-offs.

Tulsa Winch
TULSA, OKLAHOMA DIVISION OF VICKERS Inc.

French Firm to Build 146-Mile Crude Line in Iran

A French firm, Societe Entrepose, has announced plans to build a 146-mile crude oil pipe line in Iran.

The six inch line, from Azna to Isfahan, will have a capacity of 6000 barrels daily and will cost an estimated $5 million.

Pennsylvania Gas Receives Approval for 38 Miles of Line

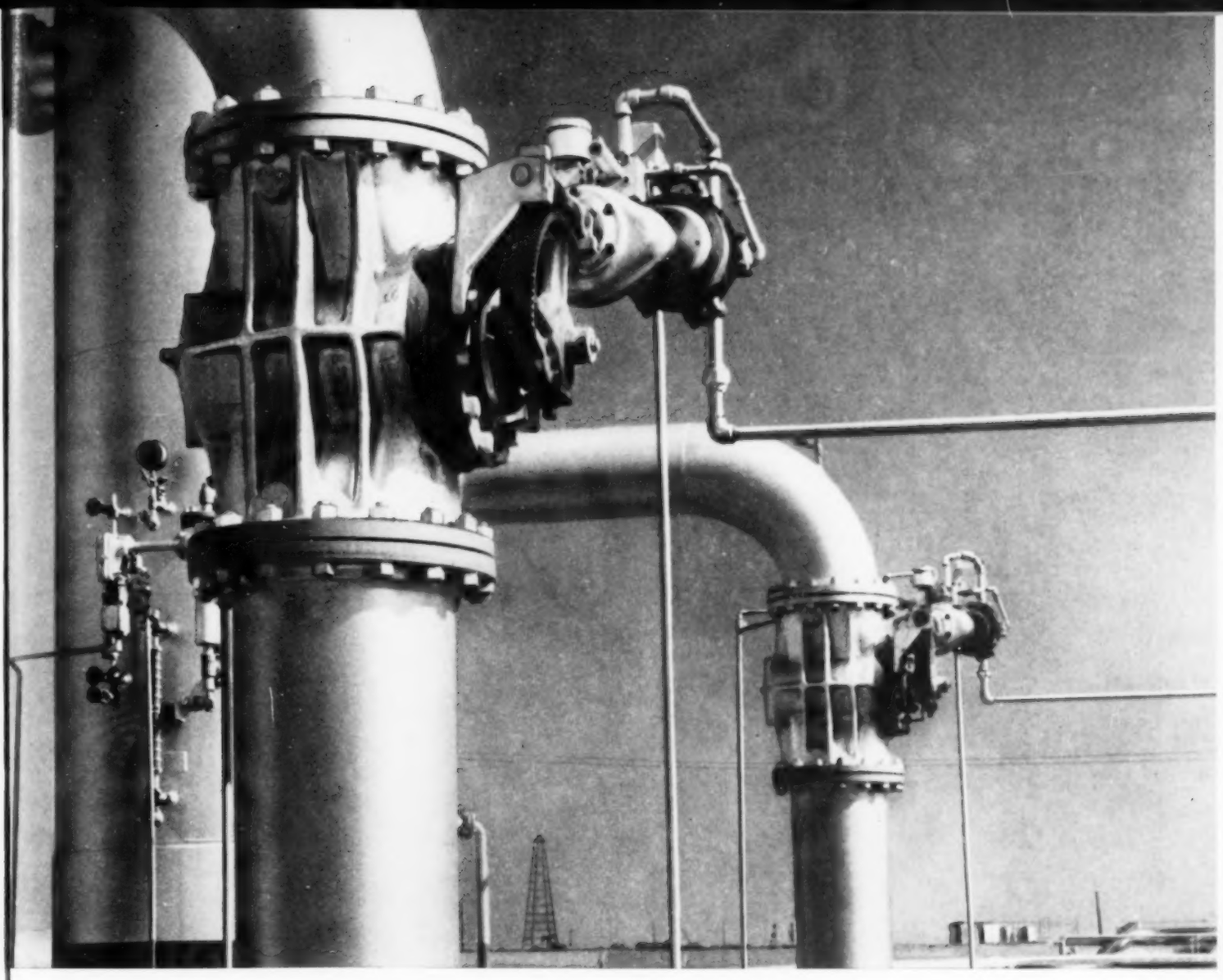
Pennsylvania Gas Company has received Federal Power Commission authorization to construct two natural gas pipe lines totaling 38 miles in Erie and Warren Counties, Pa., and Chautauqua, N. Y.

Estimated to cost $2.6 million, the project includes 23 miles of 10¾-inch line in Erie County, 15 miles of 8⅝-inch line in Warren and Chautauqua Counties, 30 miles of branch lines in Pennsylvania and some small distribution systems.

Pacific Northwest Revises Projects before FPC

Pacific Northwest Pipeline Corporation has revised two applications before the Federal Power Commission proposing facilities to allow Pacific Northwest to deliver natural gas to

For more data on advertised products, use Readers' Service Cards, last page.



WHAT'S THE BEST VALVE FOR POWER OPERATION?

Years of field proof throughout the oil, gas and pipeline industries show that Rockwell-Nordstrom lubricated plug valves are best for power operation—best for *performance*, best for *economy*. Here's why:

LOW TORQUE of the *lubricated* plug movement requires less powerful operators.

QUARTER-TURN OPERATION means that the actuator only moves through 90° . . . a simpler, less costly power system is needed.

LUBRICANT SEALING eliminates the hard to control, extra heavy "push" needed on forced or wedged metal-to-metal seat valves.

INSTANT OPERATION is assured by the hydraulic jacking action of the pressurized lubricant to keep the plug free for *fast* response.

Protected seats and the prevention of metal-to-metal wearing friction by lubricant assures longer life, lower cost and better performance.

Rockwell-Nordstrom valves are available in a full range of sizes and pressure ratings for electric, pneumatic and hydraulic operation. Write for complete details: Rockwell Manufacturing Company, Pittsburgh 8, Pa. Canadian Valve Licensee: Peacock Brothers Limited.

ROCKWELL-Nordstrom **VALVES**

Lubricant Sealed For Positive Shut-off

Mountain Fuel Supply Company and Colorado Interstate Gas Company.

The revised plan reduces the estimated cost of the facilities from $3.1 million to $1.1 million through elimination of proposed additional horsepower.

Pacific Northwest will use these facilities to deliver 58.8 million cubic feet of natural gas daily to Mountain Fuel and deliver an additional 17.5 million cubic feet of gas on peak days to Colorado Interstate.

In another proposal the firm seeks to construct 22,500 horsepower in existing stations and to install sales meter facilities and enlarge its San Juan processing plant at an estimated cost of $9.2 million.

Northern Natural Proposes 365-Mile Main Line Expansion

Approval for construction of a $65.7 million pipe line project has been requested by Northern Natural Gas Company. The application, filed recently with the Federal Power Commission, seeks authority to bring natural gas service to an additional 213 communities in the Northern Plains.

The project will increase Northern's daily salable capacity from approximately 1.19 billion to 1.34 billion cubic feet through construction of 365 miles of main line, 1090 miles of branch lines, 178 town border stations, 20 new compressor engines and the conversion of nine other compressor units.

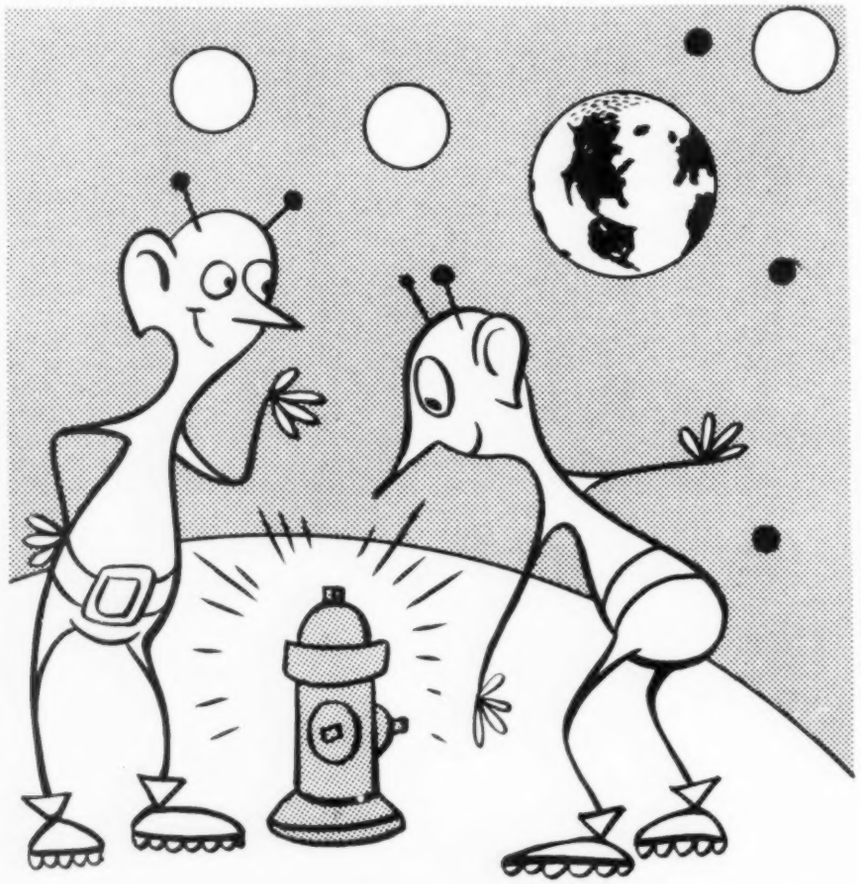
The new facilities will service towns in Minnesota, Iowa, South Dakota, Nebraska and Wisconsin.

Two other filings involving facilities to help provide a portion of the additional gas supply needed for this expansion program were made. One covers Northern's plans to withdraw and sell up to 50 million cubic feet of gas per day from its Redfield, Iowa, storage field and the other is for increased deliveries from Permian Basin Pipeline Company to Northern from 300 to 375 million cubic feet of gas per day.

Gulf Interstate Gets Approval For $24 Million Project

Gulf Interstate Gas Company has been given temporary authorization by the Federal Power Commission to construct natural gas facilities costing an estimated $24.5 million. The additional facilities would up Gulf Interstate's designed daily delivery capacity to 575 million cubic feet per day.

The proposed facilities include the addition of 69,000 horsepower in 10 existing main line compressor stations located in Kentucky, Tennessee, Mississippi and Louisiana. A 300 horsepower compressor station at East Mud Lake field, Cameron Parish, La. and approximately 10 miles of gathering line from the Erath field is also included.



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PARKHILL TRUCK COMPANY
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American Louisiana Pipeline carrying natural gas 1000 miles from Louisiana to Michigan, was given the proven protection of coal-tar enamel coatings. Three different types of enamels were used on various sections: Bitumastic® No. 2 Enamel for application in mild climates, Bitumastic No. 70-B Enamel for application to portions subjected to colder weather, and Bitumastic Hi-Melt Enamel for hot sections of the line after compressor stations. There's a Bitumastic Enamel for every pipeline need, from hot-line coating to sub-zero conditions. Your Koppers representative will be glad to explain why coal-tar enamel is your best investment for long-lasting protection of underground pipelines.

Metal Buildings have longer useful life when they are protected against corrosion by Bitumastic coatings. This oil company warehouse was completely cleaned, then coated with a system using Bituplastic® No. 28, a sunlight-resistant coal-tar coating. Added life of the structure through this treatment is estimated at 10 years.

This New Bulletin outlining the useful scope of Bitumastic cold-applied protective coatings is now available. You'll find it a handy guide in the selection of corrosion-resistant coatings for your applications. For your copy, write: Koppers Company, Inc., Tar Products Div., 1450 Koppers Bldg., Dept. 121E, Pittsburgh 19, Pa.

how to
CUT CORROSION LOSSES
a report by Koppers Company, Inc.

Number 9 of a series

W. E. Kemp
Manager, Technical Department

One problem in the protective coating of steel structures is that of *interim protection* between fabrication and erection. In some cases this is a relatively short time; in others, as much as two or three years. Here is a typical question put to us recently by an engineering firm purchasing fabricated steel penstocks for shipment and erection overseas. Since penstocks are constantly exposed to water, coal-tar enamel coating is usually applied after erection.

* * *

"On jobs where the sandblasting of surfaces to bright metal prior to priming and coating is mandatory and the time between fabrication and erection is 3 months to 1 year, should we (1) shop-prime only before shipment or, (2) ship uncoated or, (3) sandblast and prime in the shop, then ship and clean (not sandblast) and prime as necessary in the field?"

The inquirer went on to ask what we would recommend if the interim period was *more* than one year or more than *two* years. Obviously, it's difficult to answer questions like this without knowing specific field conditions. However, here are our general recommendations on the protection of steel between fabrication and field enameling.

If specific job conditions specify that sandblasting be done in the field, the best practice would be to ship the steel *uncoated*, provided that it will not be exposed for more than one year to atmospheric corrosion. Actually, the rusting which will occur on the unprotected surfaces will serve to destroy mill scale which should *always* be removed prior to coating. In our experience, shop-priming without sandblasting prior to shipment almost always gives difficulty in the field.

If the steel is to be installed during a period of three months to one year after it leaves the shop and there is a choice as to where the sandblasting will be done, we still recommend the above procedure. Less satisfactory, but the best alternate, would be to sandblast and shop-prime before shipment; then wire brush, prime and enamel in the field.

If the steel will not be enameled or coated for more than two years after fabrication, a detailed examination of the corrosive atmosphere in which the steel will be stored must dictate the coating procedure.

* * *

Another important point in corrosion prevention on fabricated metal is the physical handling necessary for shipment, storage and erection of the structures. If excessive handling is anticipated, it has been our experience that it is more economical and efficient to field coat. Shop coating may be scratched and chipped to a point where it becomes very time-consuming and costly to "touch-up" the structure after erection.

* * *

If you have any questions about corrosion control or specific problems, write: Koppers Company, Inc., 1450 Koppers Building, Department 121E, Pittsburgh 19, Pa. District Offices: Boston, Chicago, Los Angeles, New York, Pittsburgh and Woodward, Ala. In Canada: Koppers Products, Ltd., Toronto, Ontario, and Edmonton, Alberta.

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Proposed Pipe Line Construction

COMPANY	Length in Miles	Diameter	Type	Origin and Terminus	Estimated Cost	Status
Alberta Gas Trunk Line, Ltd.	116	18, 34	Gas	To connect with Bindloss and Provost fields	.....	Contracts let
Alaska-Yukon Refiners and Distributors, Ltd., Edmonton, Alta.	150	....	Products	Serving Alaska and Yukon Territory	$3.5 million	Planned
American-Louisiana Pipe Line Co., Detroit	....	12-16	Gas	From No. Holly Beach field and Second Bayou field, Cameron Parish, La.	$1.5 million	Authorized
Andes Pipeline Corp.	500	12	Gas	From Villamontes, Bolivia to Antofagasta, Chile.	$30 million	Planned
Bolivian Gulf Oil Co.	201	8-10	Crude	Sicasica, Bolivia to Arica, Chile	$10.5 million	Planned
	....	14	Crude	Camiri field to Santa Cruz	.....	Considered
British Petroleum Company	....	16	Crude	Popton Point, South Wales, to Llandarcy refinery	$14 million	Considered
Canada Southern Petroleum, Ltd.—Calgary	400	....		Dawson Creek, B.C. to coast	.....	Considered
Central Hudson Gas & Electric Corp., Poughkeepsie, N. Y.	46	10	Gas	Albany to Kingston, N.Y.	.....	Planned
Cities Service Gas Co., Oklahoma City	116	....	Gas	Facilities in Kansas and Oklahoma and pipe lines in Kansas	$11.4 million	Authorized
Cities Service Pipe Line Co.	168	6	Products	East Chicago, Ind. to Lowell, Mich.	.....	Planned
Coastal Transmission Corp.—Houston, Texas	565	20-26	Gas	McAllen, Texas—Louisiana connection, Houston, Texas Gas, plus 272 miles of laterals	$68 million	Authorized
Colorado Interstate Gas Co., Colorado Springs, Colo.	734	22-34	Gas	Texas & Oklahoma Panhandle to Kit Carson, Colo., to Beatrice, Neb.	$87 million	Before FPC
Consolidated Gathering Systems, Ltd.	198	....	Crude	Sturgeon Field—Edmonton.	.....	Planned
Creole Petroleum Corp.	94	28	Crude	Temblador to Caripito, Venezuela	$5.6 million	Planned
Deep Rock Gas Co.	120	6	LPG	Tioga, N.D.—Canadian border	.....	Planned
El Paso Natural Gas Co.	290	6-34	Gas	Facilities in Texas, New Mexico, and Arizona to deliver gas near Blythe, Calif. and Topock, Ariz. to So. Counties Gas Co., So. Calif. Gas Co. and Pacific Gas & Electric Co.	$107 million	Before FPC
	108	....	Gas & Products	Facilities in Andrews and Ector Counties, Texas	$5 million	Authorized
	28	10	Gas	Nolan and Coke Counties, Texas, plus compressor station facilities	$1 million	Authorized
El Paso Natural Gas Products Co.	240	8	Products	Midkiff natural gasoline plant in Permian Basin to El Paso	.....	Planned
Four Corners Pipe Line Co.—Houston	600	16	Crude	From Four Corners Area to Los Angeles plus 150 miles of feeder lines	$50 million	Planned
Gaz de France	550	12-24	Gas	Main line from Lacq field to Paris plus 450 miles o branch lines to Lyons, Nantes and Chateaurous	.....	Planned
Great Lakes Pipe Line Co., Kansas City, Mo.	84	8	Products	Extension of system to Eau Claire, Wisc.	.....	Planned
	68	12	Products	From intersection of system with Badger Pipe Line, into Chicago.	.....	Planned
	140	8	Products	From company's terminal at Minneapolis to terminals at Superior, Wisc.	.....	Planned
	34	12	.....	Tulsa to Barnsdall, Okla.	.....	Planned
	14	8	.....	Coffeyville to Independence, Kansas	.....	Planned
	11	8	.....	East of Great Lakes pumping Station at Donahue, Iowa, to Bettendorf, Iowa	.....	Planned
Great Northern Railway	....	....	Crude	Outlet in the St. Paul-Minneapolis and Duluth-Superior areas.	.....	Considered
Houston Texas Gas & Oil Co.—4604 Main St., Houston	961	12-30	Gas	Baton Rouge, La. to Miami, Fla. plus 496 miles of laterals and compressor facilities	$105 million	Contracts let
International Petroleum Co.	180	....	Crude	Pasto, Colombia, to Pacific port of Tumaco	.....	Considered
Iraq Government	150	....	Gas	Kirkuk field to Baghdad	.....	Considered
Iraq Petroleum Co.	1,200	34-36	Crude	Two parallel lines from Kuwait through Iraq to Mediterranean	.....	Considered
Iron Ranges Natural Gas Co.	115	....	Gas	From Itasca and St. Louis Counties along route of Mesabi range from Grand Rapids to Aurora, Minn.	$5 million	Before FPC
Iroquois Gas Corp.—Buffalo, N.Y.	36	....	Gas	Facilities in Chautauqua, Cattaraugus and Erie counties, N.Y. to develop new underground storage area.	$2.8 million	Authorized
Israel Government	....	....	Crude	Extension of Elath-Beersheba line to Mediterranean	.....	Planned
Laurel Pipe Line Co.	....	20	Products	Philadelphia to Pittsburgh	.....	Planned
Magna Pipeline Company	40	....	Gas	Underwater line from Anacortes, Wash. to Victoria, B.C.	$6 million	Planned
Magnolia Pipe Line Co.	....	....	Crude	Loops and Additional pumping equipment on Midland to Beaumont line	.....	Planned
Mene Grande Oil Co.	62	30	Crude	Anaco to Puerto La Cruz, Venezuela	$5.8 million	Considered
Michigan-Wisconsin Pipe Line Co.—500 Griswold, Detroit	472	4-24	Gas	Main line loops and extensions in Wisconsin, Illinois	$17.6 million	Before FPC
Midwestern Gas Transmission Co., Houston, Texas	1112	....	Gas	Emerson, Manitoba—Nashville, Tenn.	$98 million	Before FPC
Mississippi River Fuel Co.—St. Louis	125	....	Gas	Loops along existing parallel lines in La. and Texas to St. Louis plus additional station horsepower	$12 million	Before FPC
Mountain Fuel Supply Company	38	20	Gas	Parallel line and facilities to transport gas from Pacific Northwest line in Sweetwater County, Wyo.	$3 million	Authorized
Natural Gas Pipe Line Co. of America—20 N. Wacker Dr., Chicago	350	20, 26	Gas	Wise County, Texas—Fritch, Texas	$28.5 million	Some contracts
	25	....	Gas	Quinduno field in Roberts County, Texas	$3.2 million	Authorized
	416	36	Gas	Loops at various points along existing line	$76.2 million	Before FPC
	337	30	Gas	Loop line between company's terminus in Texas and Beatrice, Neb.	$62.7 million	Before FPC
	59	36	Gas	Beatrice to Joliet, Ill.	.....	Before FPC
NATO	1920	4-10	Products	To serve military bases in Western Europe	.....	Some contracts let
New York State Natural Gas Corp.	27	....	Gas	Elk County, Penn. to Luthersburg gas field in Clearfield, Jefferson and Indiana Counties, Penn.	$1.5 million	Authorized
Northern Natural Gas Co.—2223 Dodge St., Omaha	167	24	Gas	Farmington, Minn. to Duluth, Minn. and Superior, Wis.	$12 million	Before FPC
	42	10	Gas	Rochester, Minn. to Winona and Goodview, Minn.	$963,000	Before FPC
	365	....	Gas	New facilities in Minn., Iowa, S.D., Neb., Wis., plus 1090 miles of branch line and station facilities	$65.7 million	Before FPC
North-West Pipelines Co.	200	....	Crude	Wilhelmshaven on North Sea to Ruhr area of Germany	$46 million	Approved
Northwest Pipeline Corp.	350	6-10	Crude & Products	Four Corners area to Salt Lake City, Utah	$15 million	Planned
Ohio Fuel Gas Co., Columbus	31	....	Gas	Plus storage facilities in Vinton, Holmes, Medina, Wayne, and Ashland Counties, Ohio	$2.5 million	Authorized
Ohio Oil Company, Findlay, O.	200	....	Products	Wood River, Ill. to Chicago	.....	Planned
Oklahoma Natural Gas Co., Tulsa	16	8	Gas	Connect gas supplies in Gotebo field, Okla., to Clinton System in Western Okla.	$350,000	Planned
Pacific Gas & Electric Co.	223	34	Gas	Various loops, between Topock, Ariz.—Milpitas, Calif.	$20 million	85 miles let
	200	12	Gas	Northern California gas fields to Humboldt County, California	$9.5 million	Planned
Pacific Northwest Pipe Line Corp.—Salt Lake City, Utah	50	4-6	Gas	To serve industrial customers at Uravan and Nucla, Colo.	$1 million	Authorized
	1000	....	Gas	Gathering system in San Juan Basin and sales laterals in Washington plus compressor facilities	$30 million	Planned
Pennsylvania Gas Co.	38	8, 10	Gas	In Erie and Warren Counties, Penn., and Chautauqua County, N.Y.	$2.6 million	Authorized
Permian Basin Pipeline Co., Omaha, Neb.	83	16	Gas	Facilities near Spraberry compressor station, Midland County, Texas, to tie in with Pioneer Gathering System, Schleicher County, Texas.	$5 million	Before FPC
Petroargentina	370	16	Crude	Newguen—Bahia Blanca, Argentina	$40 million	Planned
Petroleos Mexicanos—Ave. Juarez, 94, Mexico City	440	20	Gas	Brazil—Tampico—Poza Rica, Mexico	.....	Planned
	145	12	Crude	18 de Marzo Field—Monterrey, Mexico	.....	Considered
	80	8	Products	Guaymas—Los Mochis	$1 million	Planned
	150	22	Gas	Monterrey to Reynosa to tie-in to Texas Eastern System	.....	Planned

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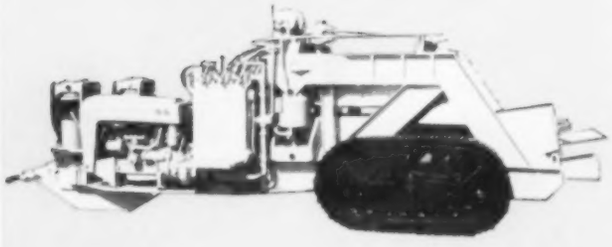

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Proposed Pipe Line Construction—(Continued)

COMPANY	Length in Miles	Diameter	Type	Origin and Terminus	Estimated Cost	Status
Piedmont Gas Co.—Hickory, N.C.	78	2-8	Gas	From connection with Transcontinental Gas Pipe Line to serve customers in North Carolina	$2.6 million	Before FPC
Royalite Oil Co.—Calgary	350	....	Crude	Athabasca tar sand plant in Northeastern Alberta to Edmonton	.....	Planned
Salt Lake Pipe Line Co.—Salt Lake City	100	10	Crude	Plus additional pumping facilities on Rangely to Salt Lake City line	.....	Planned
	80	8	Products	New line from Boise, Idaho, to Pasco, Wash. plus additional pumping facilities on Salt Lake City to Spokane line	.....	Planned
Saskatchewan Power Corp.	80	....	Gas	Hatton gas field to Success, Sask.	.....	Planned
	40	....	Gas	Moose Jaw, Sask. to Regina, Sask.	.....	Planned
Service Pipe Line Corp., Continental Pipe Line Co., Sinclair Pipe Line Co. and Phillips Petroleum Co.	....	....	Products	Salt Lake City to Spokane, Wash.	.....	Considered
Skelly Oil Co.	38	8	Crude	Gathering system extension from Nichols field to southern Kiowa County, Kansas	.....	Planned
Societe Entrepose—France	146	6	Crude	Azna to Isfahan, Iran	$5 million	Considered
Societe Nationale de Recherche et d'Exploitation des Petroles en Algerie (S.N. Repal) andCompagnie Francaise des Petroles, Algeria	500	....	Crude	Through Sahara Desert of Algeria, through Tunisia to Lybian border	.....	Considered
Southern Kansas Pipe Line Co., Inc.	200	6-10	Crude	Southwestern Kansas to Arkansas City, Kansas	.....	Planned
Southern Natural Gas Company	52	....	Gas	Various locations in Ga.and La.	$2.2 million	Authorized
Stanmount Pipe Line Co.	140	10	Crude	Cayiga and Beaver Lake Fields, N.D. to connect with Interprovincial Pipe Line	.....	Planned
Sturgeon Pipe Line, Ltd.	100	12	.....	Sturgeon Lake Field—Trans-Mountain system	$6.5 million	Planned
Sui Gas Transmission Co.	145	....	Gas	Sylhet to Dacca, East Pakistan	$9 million	Considered
Tecumseh Pipeline Co.	190	20	Crude	To connect to principal crude line carriers in Chicago area for movement to east	.....	Contracts let
Tennessee Gas Transmission Co.—Box 2511, Houston (See also Midwestern Gas Transmission Co.)	100	....	Gas	Gathering lines in Texas and Louisiana plus station additions	$18.6 million	Before FPC
	1085	12-30	Gas	Southeast La. to Portland, Tenn.; from Kinder, La., to offshore wells in Gulf of Mexico; from Coudersport, Penn., to Hamburg, N.Y., and loop lines in Ky., W. Va., Penn.; compressor stations in Miss., Tenn., N.Y., Penn.: and additions in Tenn., Ky., Ohio, and Penn.	$166 million	Authorized
Texas Eastern Transmission Corp. and Texas Eastern Penn-Jersey Trans. Corp.	137	30	Gas	Loops along line from Kosciusko, Miss., and Uniontown, Penn., and lateral supply lines plus addition of 67,610 horsepower compression facilities to systems	$30.3 million	Before FPC
Texas Gas Transmission Corp.	40	6-30	Gas	Parallel lines and compressor additions on existing lines in Louisiana, Missouri, Mississippi, Illinois, Kentucky	$6 million	Authorized
	....	....	Gas	To deliver gas from four Louisiana gas fields to American Louisiana system.	$783,100	Authorized
	13	20	Gas	East Lake Palourde line, Assumption Parish, to Thibodaux area, Lafourche Parish, plus metering facilities	$1.5 million	Authorized
Texas Illinois Natural Gas Pipeline Co., Chicago	38	3	Gas	Loops facilities in Illinois	$6.4 million	Authorized
Texas-New Mexico Pipe Line Company, Houston	515	16	Crude	Extension from Jal, N. Mex., pump station to Four Corners.	.....	Planned
Trans-Canada Pipe Line, Ltd.—Calgary, Alberta	2250	36	Gas	Alberta—Eastern Canada	$378 million	Contracts let for 6 spreads
Transcontinental Gas Pipeline Corp.—Houston	287	....	Gas	Loop lines and gathering laterals in Texas and compressor facilities in La., Miss., Ala., Ga., N.C. and Va.	$61.5 million	Before FPC
	28	16	Gas	Lateral in Cameron Parish, La., to take Transco's first offshore gas purchase	.....	Before FPC
Trans-Europe Pipe Line	500	30	Crude	Mediterranean to northern Europe	.....	Considered
Trans-Mountain Pipe Line Co.—Vancouver, B.C.	100	30	Crude	Loops parallel to existing line east of Kamloops, B.C. and west of Edson, Alta. and station facilities.	.....	Contracts let
Underground Storage & Exploration—Upper Darby, Penn.	394	....	LPG	Moundsville, W. Va. to Marcus Hook, Penn.	.....	Considered
Union Gas Co. of Canada	142	26	Gas	Dawn storage area to Hamilton, Ontario plus branch lines	.....	Planned
United Gas Pipe Line Co.—Shreveport	40	8	Gas	From Baldwin County, Ala. to Container Corp. of America plant, Brewton, Ala.	$1.2 million	Authorized
United Natural Gas Co.	50	12	Gas	Elk County—Jefferson County, Pa.	.....	Planned
Washington Gas Light Co.—Washington, D.C.	28	20, 24	Gas	From metering station of Atlantic Seaboard Corp. to Washington to connect with line leading to District of Columbia facilities	$3.4 million	Authorized
Westcoast Transmission Company, Ltd., Calgary	270	8-26	Gas	Various locations in Peace River region	.....	Contracts let for 155 miles
	174	30	Gas	Savanna Creek gas field, Alberta, to British Columbia border	.....	Planned
Westspur Pipe Line Co.	20	12	Crude	Alida to Carnduff-Glen Ewen area of Saskatchewan plus 34 miles of gathering line	.....	Planned
	75	16	Crude	Loop line in southeastern Saskatchewan	.....	Planned
Winnipeg and Central Gas Co.	450	4-8	LPG	Tioga, N.D.—Winnipeg, Canada	$20 million	Planned
Yacimientos Petroliferos Fiscales	808	....	Gas	Campo Duran, to Buenas Aires, Argentina	$76 million	Planned
	621	....	Crude	Mendoza to San Lorenzo, Argentina	$19 million	Planned
Yacimientos Petroliferos Fiscales Bolivia	86	....	Crude	Yacuiba to Bermejo, Bolivia	$3 million	Considered

FPC Approves Gas Service To Ohio Aluminum Plant

Manufacturers Light and Heat Company has received temporary approval to construct and operate facilities giving direct natural gas service to Olin Mathieson Chemical Corporation's aluminum plant near Buck Hill Bottom, Monroe County, Ohio.

The facilities approved by the Federal Power Commission consist of approximately 9 miles of transmission line from the river to the Mathieson plant and a measuring and regulating station.

The estimated cost of the proposed facilities is approximately $884,000.

A second FPC ruling authorizes the Manufacturers Light and Heat Company to construct and operate a 5,280 horsepower compressor station and other related facilities in Marshall County, W. Va. The total cost is estimated at $3.6 million.

Plans are for the new station to replace the existing 2,500 horsepower Majorsville compressor station located in Washington County, Penn.

The FPC also authorized the abandonment of the existing station at the end of the 1957 storage input season.

Alberta Gas Trunk Line Lets Contract for Gathering Lines

Contracts have been awarded to Fulton Banister Ltd., Edmonton, for construction of Alberta Gas Trunk Line's gas gathering system to feed into Trans-Canada Pipe Lines system.

The project, estimated to cost $10.9 million, includes 17 miles of 34-inch pipe west from the western terminus of Trans-Canada system near Burstall, Sask., to near Cavendish, Alta., and 100 miles of 18-inch pipe north to Blindloss and Provost fields.

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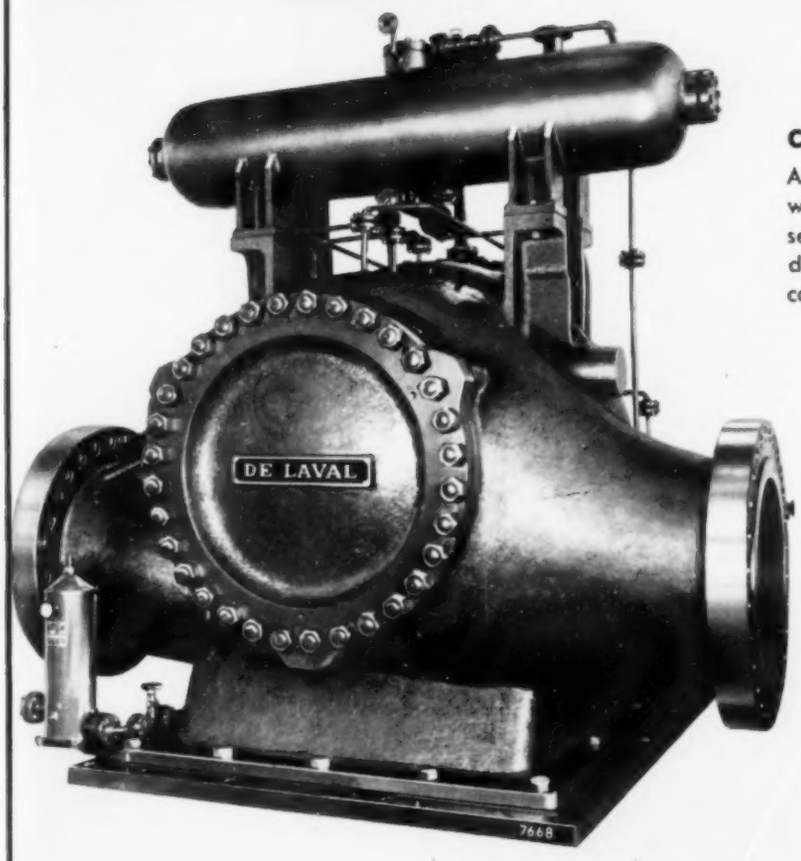
CENTRIFUGAL PIPELINE COMPRESSORS

come in two "packages" for easy installation

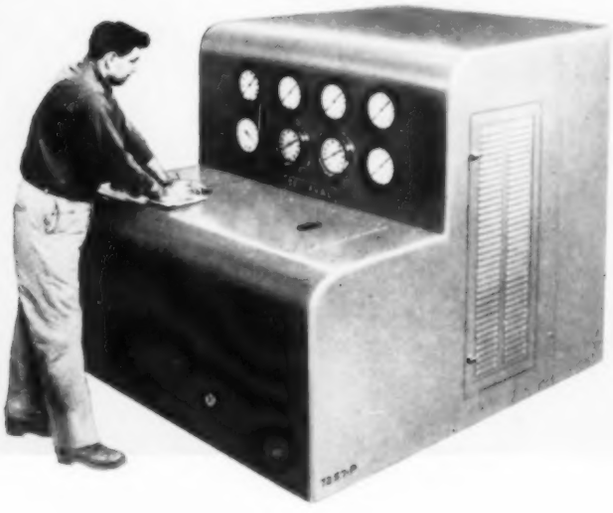


COMPRESSOR

A De Laval compressor with its emergency seal tank mounted directly on the compressor.

CONSOLE

The console contains the filters, motor-driven pumps, coolers, pressure switches, gauges and other accessories. It eliminates complicated piping on the packaged compressor . . . also serves as a protective cover for the equipment it houses.



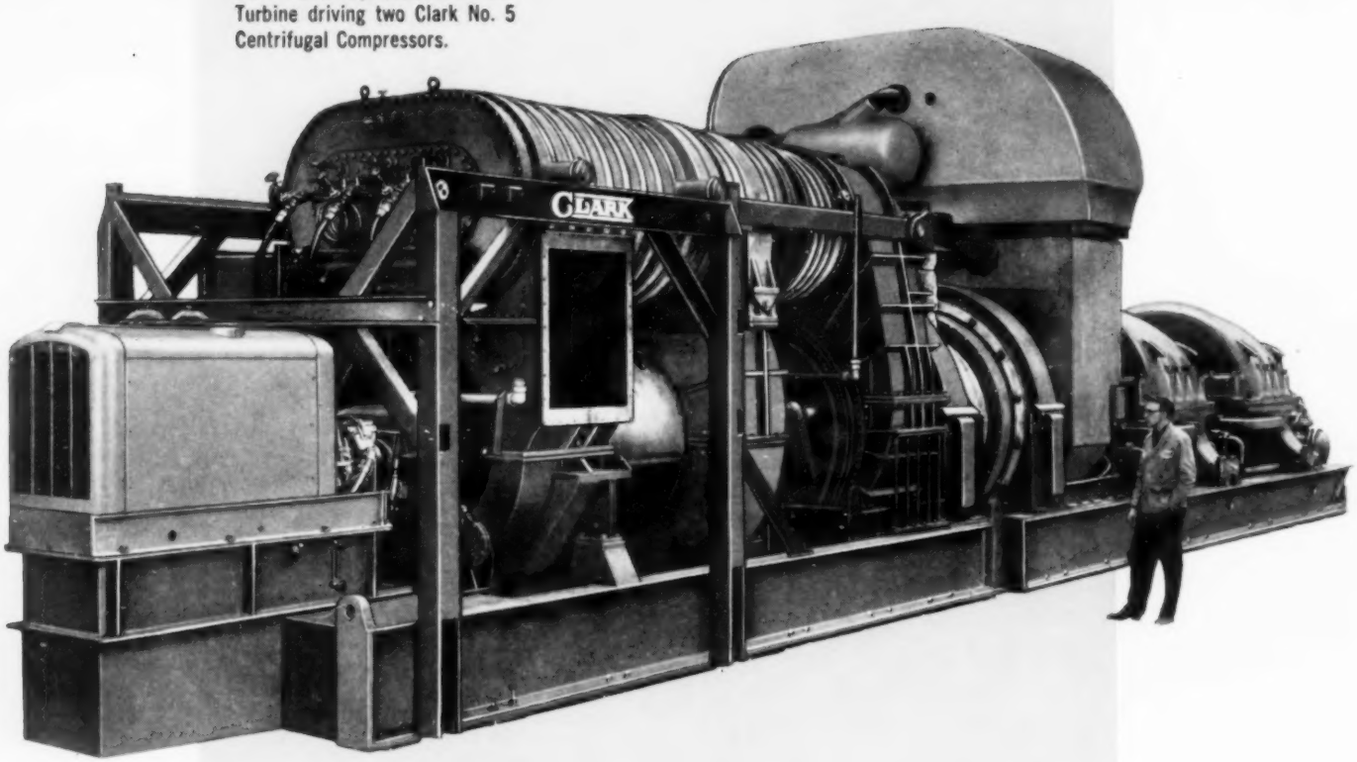
Bulletin 503 gives data on De Laval centrifugal pipeline compressors. Write for your copy.

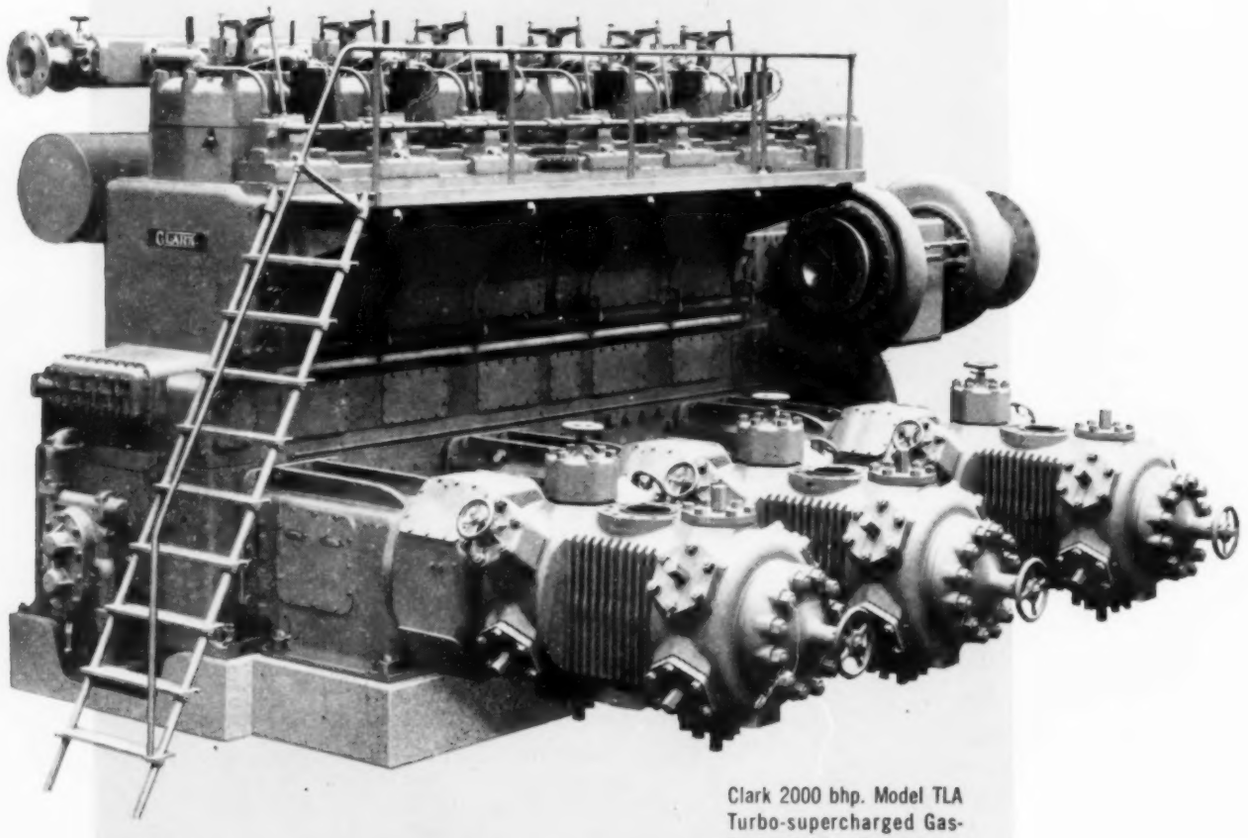
Designed in two packages, rugged De Laval centrifugal compressors offer many important engineering features. Among these are • high pressure contact shaft seal which eliminates gas leakage • heavy and rigid construction throughout • high load carrying capacity. The compressor and console arrangement makes De Laval centrifugal compressors easy to install—only simple low-cost foundations are required. De Laval units, totaling more than 280,000 horsepower, are now in operation on major pipelines.

DE LAVAL *Centrifugal Compressors*

DE LAVAL STEAM TURBINE COMPANY
884 Nottingham Way, Trenton 2, New Jersey

Clark 8500 bhp. Model 302 Gas Turbine driving two Clark No. 5 Centrifugal Compressors.





Clark 2000 bhp. Model TLA Turbo-supercharged Gas-Engine-Driven Compressor.

Gas turbines or engines?

With Clark you eliminate

Prejudice

Gas turbine-driven centrifugal compressors or reciprocating compressors . . . you can get both types from Clark

Prejudice can add substantially to the cost when selecting compressors. At Clark, we build both gas turbine-driven centrifugal compressors and gas-engine-driven reciprocating compressors. In both instances the compressors and drivers are the most modern available.

Our chief concern is to be certain that you obtain the proper unit for your specific installation. This is where our experienced application engineers enter the picture. Both types of units have certain characteristics that may make one or the other best for your particular use. An unbiased opinion, after a careful examination of all the facts and conditions, is vitally important. Clark is the only company that can give you an unbiased opinion because Clark is the only company that builds reciprocating and centrifugal compressors in addition to gas turbines.

Clark application engineers will be pleased to help you determine the right type of compressor and driver combination for your next application.

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How to do it

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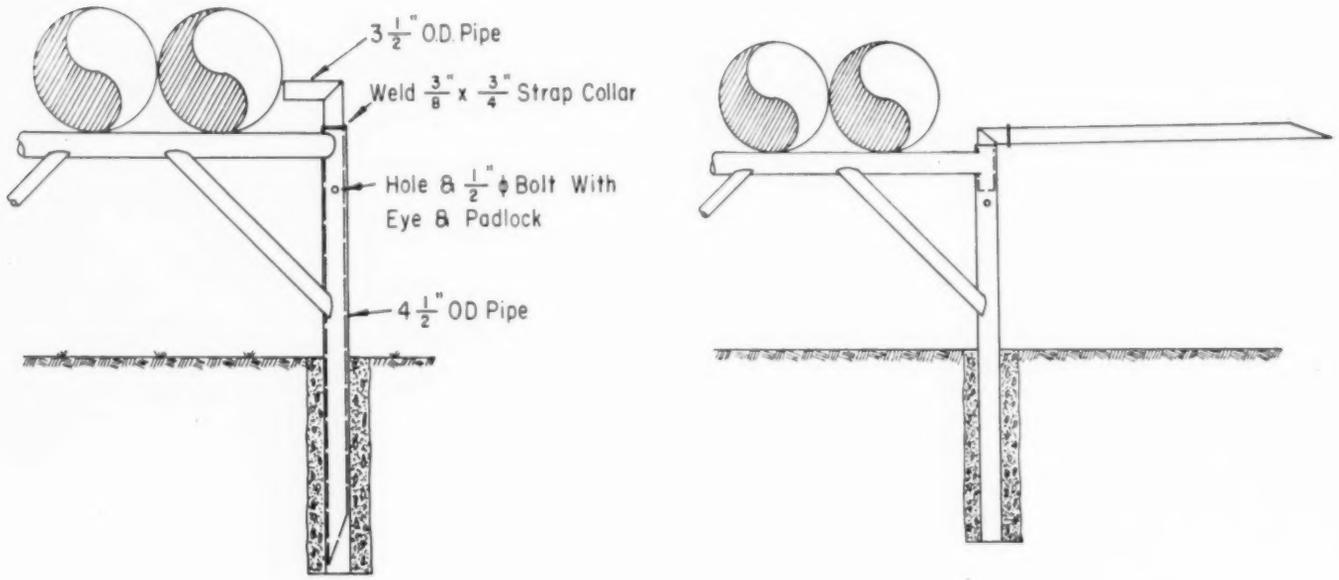


'L' Shaped Convertible Chock Doubles as Pipe Loading Ramp

In racking and loading large diameter pipe, this device can save much time and add desirable safety features.

In the construction of the pipe rack 4½-inch O.D. pipe is used and the combination chock-ramp is constructed of 3½-inch O.D. pipe. When acting as a chock, the long leg of the "L" is placed inside the 4½-inch pipe. When the desired height has been selected, a strap collar is welded around the 3½-inch pipe for positioning. A hole is burned through the 4½-inch, and a matching one in the 3½-inch pipe to admit a ½-inch bolt. One end of the bolt is equipped with an eye for a padlock.

The lock assures the removal of the chock only by personnel authorized to do so and adds to the over-all safety by eliminating usage of substitute materials for chocks.

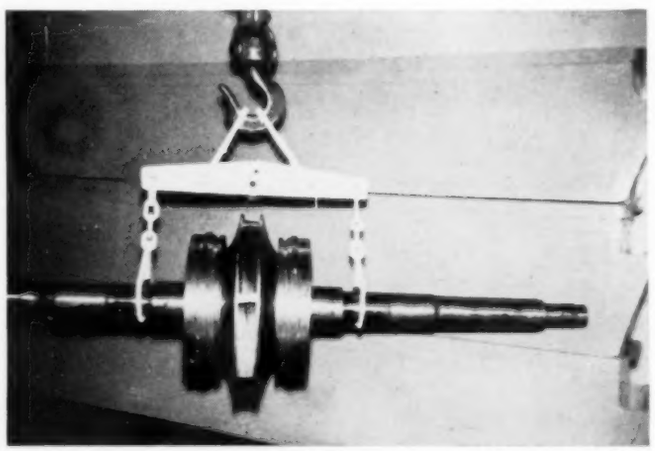
The short end of the "L," below the miter-bend, is inserted into the 4½-inch support during loading. This allows the chock to be used as a temporary loading ramp when necessary.

Adjustable 'Ice Tongs' Aid Removal of Impeller Assembly

The beam on this grab hook arrangement is made from scrap ½-inch thick steel, and is 3 inches wide by approximately 20 inches long. The length can be varied to accommodate the size impeller assembly being handled, and holes can be spaced to give the desired clearances. One-half inch round steel or scrap chain can be used in making the links connecting the hooks to the lifting bar, and to connect the lifting bar to the chain hoist hook.

The hooks, made on the ice-tong theory, are made slightly larger than the size shaft to be handled, and are lined with brass to avoid damage to the shaft.

No chain, hooks or other lifting equipment is needed



in removing the impeller assembly, and the same rig can be used for the reinstallation.

Construct Field Gate Hardware With Scrap Pipe, Steel Rod

The fittings for hanging a field gate can be made with a minimum of labor, and practically no cash outlay for materials. Six-inch lengths of ¾-inch pipe are welded to one end of the gate in a vertical position. A hole, large enough for a ½-inch bolt, is burned through the supporting post under the location of each piece of pipe. Slip ½-inch bolts through the holes, and bend upward 90 degrees. With the pipes fitted over the two bolts, the hinge is complete.

The latch consists of a piece of ½-inch steel rod, with a 90 degree bend 4 inches from one end. The rod slides through a ¾-inch pipe nipple, and extends into a hole drilled in the post adjacent to the free end of the gate. A short knob or washer can be welded into position on the rod near the end next to the post. This will eliminate the loss of the latch by sliding all the way back through the ¾-inch nipple.

This simple system costs little or nothing to install and will perform satisfactorily under almost any condition.

Improvised Caisson Used on Underwater River Crossings

Repairing a leak in a submarine river crossing can often be troublesome and costly. One company solved the problem with this novel, labor-saving idea.

The leak was located 84 feet out in the river and 5 feet below the surface (note 10-inch line with weights, at left of catwalk). A catwalk of 2 by 12's on 4-inch pipe standards was built to reach the site.

A ¼-inch steel tank, 6 feet in diameter and 7 feet deep, was rolled onto the walk. Slots were cut in the sides of the tank to fit over the 10-inch pipe. Cut out pieces were replaced to help keep the tank watertight. Sand bags aided in reducing inflow as the tank was jetted down into position over the leak.

Two 3-inch pumps (see picture) kept the water-level below the pipe while the leak was repaired. The elimination of cribbing can give definite savings of materials, and labor on future repair jobs.

Announcing

THE NEW PIPE LINE COMPOSITE CATALOG

The publishers of PIPE LINE INDUSTRY take pleasure in announcing a new, specialized catalog service for men engaged in pipe line operations, maintenance and construction. The new publication will be a composite file of catalog data from companies selling their products or services to:

- Crude Pipe Line Companies
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- Engineering-Design-Construction Firms

The PIPE LINE COMPOSITE CATALOG will be a case bound book, indexed and cross-indexed by company and by product or service. It will contain the complete or condensed catalogs of manufacturers and service companies serving the pipe line market.

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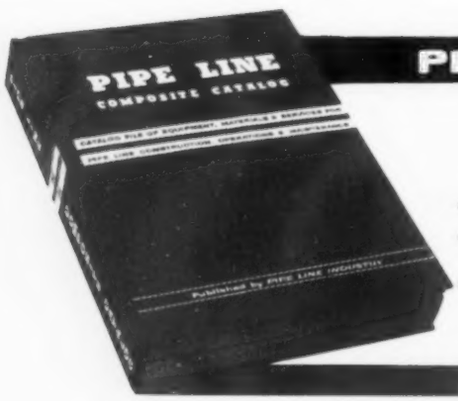
When the plan to publish this new PIPE LINE COMPOSITE CATALOG was presented to 3,500 pipe line men, they responded with overwhelming approval of the idea. More than 97% of the men answering the survey said they would prefer such a catalog, will use it and want a copy when published.

For further information concerning the new PIPE LINE COMPOSITE CATALOG, contact any of the Gulf Publishing Company offices listed below.



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For more data on advertised products, use Readers' Service Cards, last page.

Roller Installation Angle Allows Two-Way Expansion

This roller installation is used to support an above-ground tank line installation. The roller shown here is set at an angle to allow for two-way expansion. The tank line is extended the direction of the bend shown at the top of the picture.

For straight runs of pipe, the roller can be installed in line. The angle of installation is governed by the comparative lengths of pipe in each run subject to expansion.

Costly flange or valve leaks can be reduced in area subject to extreme daily temperature variations, without using expansion loops and anchors.

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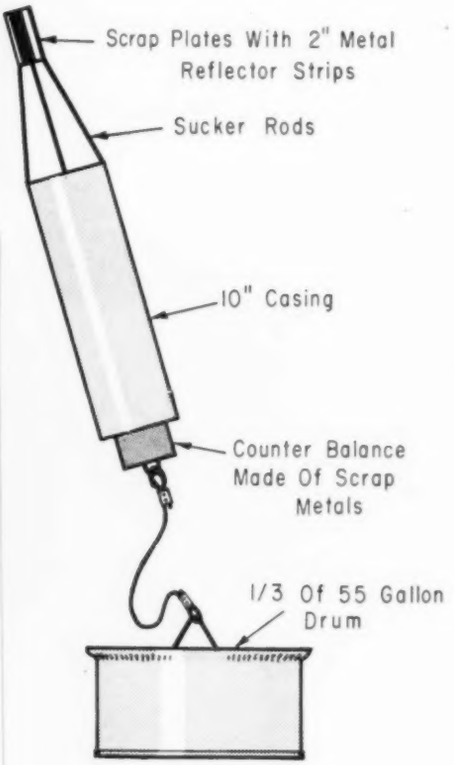
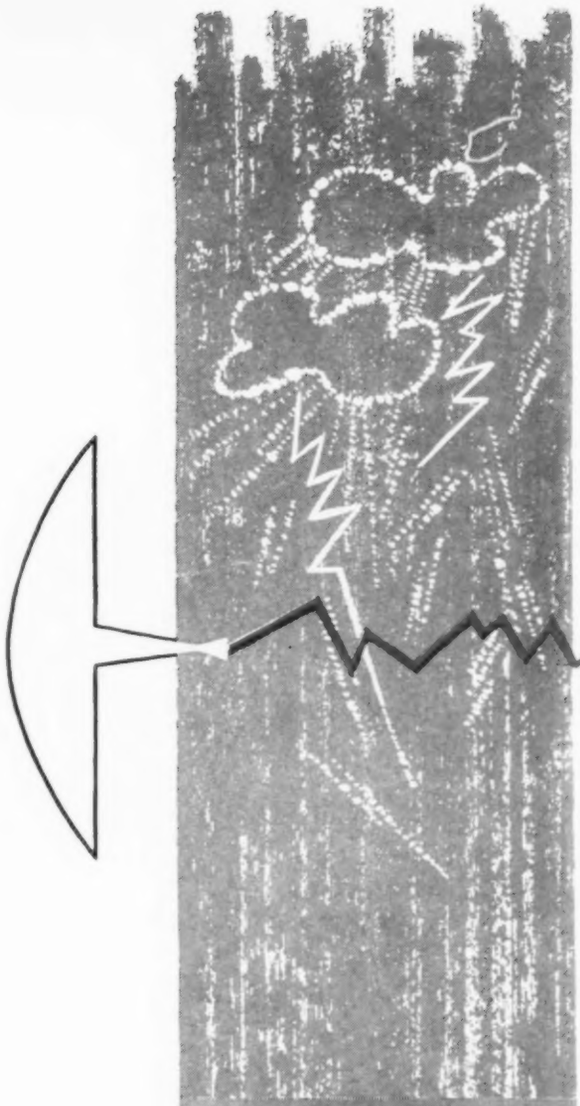

Scrap Plates With 2" Metal Reflector Strips
Sucker Rods
10" Casing
Counter Balance Made Of Scrap Metals
1/3 Of 55 Gallon Drum

Homemade Buoys Solve Channel Marking Problem

During offshore construction or maintenance, the marking of passable channels can require a considerable number of buoys. This homemade buoy can solve the problem with a minimum of expense.

The body of the buoy is a short length of 10-inch casing, with 6 to 12 inches sealed off for buoyancy. To provide an anchor hold and keep the buoy in a vertical position, a scrap metal weight is welded to one end of the "pup joint." A tripod, made from discarded sucker rods, is mounted on top of the buoy and some small 4-inch by 12-inch light gage metal plates are welded to the top of the tripod. Reflectors, reflector strips or luminous paint is used to mark the plates as desired.

For an anchor in positioning the buoy, a half of a 55-gallon drum will suffice. The portion of drum used is filled with concrete and scrap iron. The cost, including labor, will run around $30 to $50 per buoy.



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YOU CAN BE **SURE**...IF IT'S

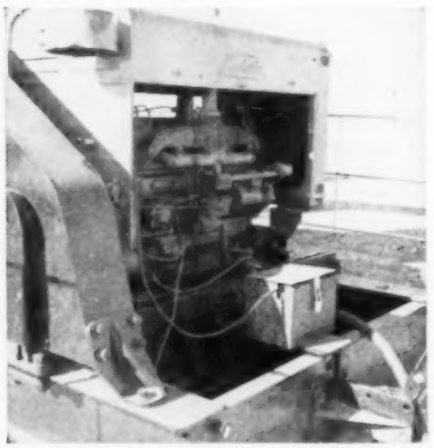
Westinghouse

Simple Chain Hoist Aids Minor Boat Repair Jobs

Minor repairs to boats are often necessary, when working in coastal and marshy areas. This simple hoisting arrangement will allow those minor maintenance and repair jobs to be completed with a minimum of lost time.

The frame is made of two piling, with a steel H-beam and chain hoist arrangement attached as shown. Knee

braces are added for increased stability. With a sling attached to the hoist, boat operators are able to change shafts, propellors, and perform secondary maintenance without the expense and lost time of towing the craft to a dry dock.



Steel Plate Container Protects Storage Battery

This container made from 3/16-inch steel plate can be welded to the skid supporting the field unit. With a notch cut in the side to admit the battery cable, a set of hinges on the back and a hasp on the front of the lid complete the unit.

The battery is protected from the customary damage due to transportation or maintenance work, while remaining in a handy position for immediate use. The container can be locked while in remote locations to discourage people from borrowing the battery.

Steel Triangle Guards Tank Truck Sample Valve

Here is a device to keep a sample valve on tank trucks from being broken. Made of three-fourths-inch reinforcing steel shaped in a triangle and welded to the tank, the protector does not interfere with the operation of opening the valve or collecting the sample. Cost is low.

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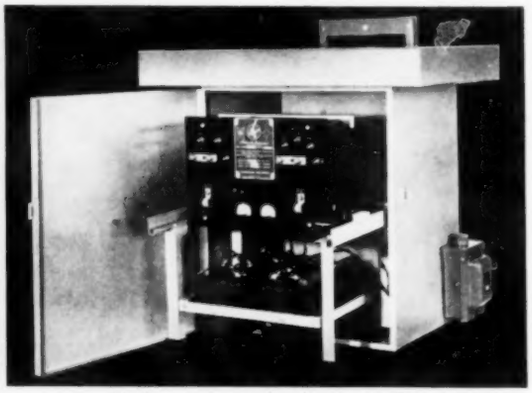
Small size steel cabinet rectifier.



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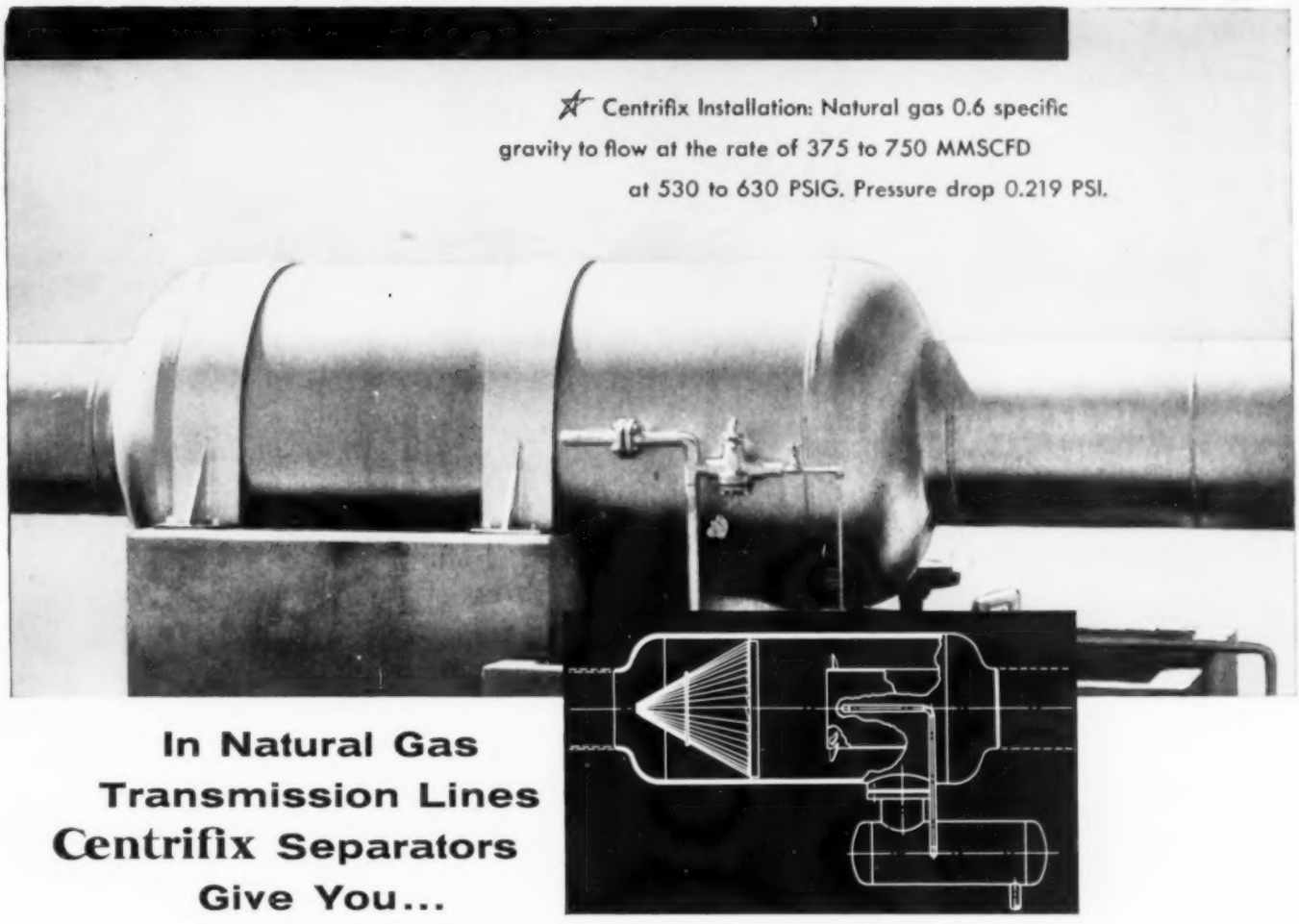
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The illustration above shows one of six recent Centrifix installations that have gone into the gas transmission lines of one company. Notice that it is a horizontal installation, the maximum length is small (being 12′ 6″ overall) and does not require the ordinary or conventional use of multiple vertical scrubbers with all their incidental piping and valves.

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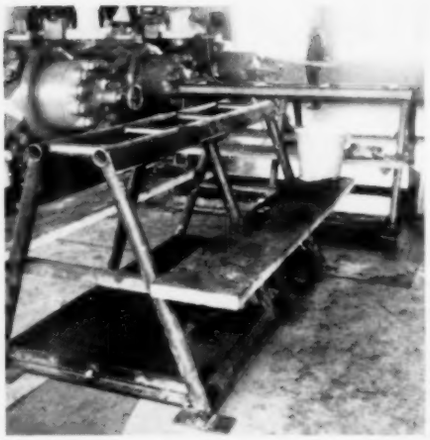
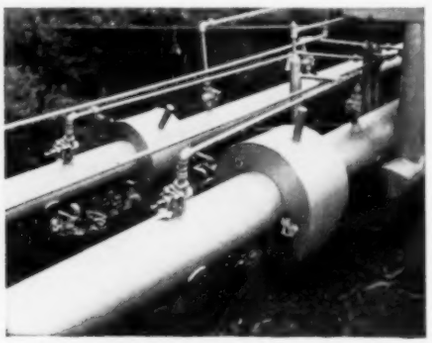
A-Frame Piston Rack Aids Compressor Overhaul



Three A-frames are used to form a convenient rack for holding pistons during maintenance overhaul. The bracing connecting the tops of the A-frames serves as a holding rack, and a removable bench or step is attached by welding short pieces of angle iron to the two end A-frames.

An oil-tight pan of sheet metal catches any drip oil before it reaches the floor. A drain is installed at one end of the pan to remove waste oil.

The flat plates on the bottom of the end A-frames can be equipped with casters to facilitate movement around a large compressor station. If rack is to remain stationary, the casters can be removed and the plates will add additional bearing area to the legs.



Sheet Metal Hood Covers Exposed Flange Couplings

In areas frequently subjected to rain, fog and salt air, the possibility of corrosion occurring at exposed bolts and surfaces of flange couplings is greatly increased. One company, in addition to taping the gap between the flanges, covers the entire installation with a sheet metal hood.

The hoods, as shown, can easily be built by a welder out of scrap light gage steel sheet. The covers rest upon the flanges in saddle-fashion, and extend below the bottom of the coupling. A handle, welded to the top of the hood, facilitates lifting and handling of the hood.

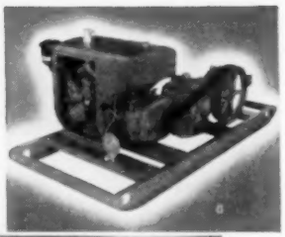
Extended corrosion-free maintenance can easily repay the relatively small cost of the installation.

Boiling Vat Offers Easy Method of Cleaning Parts

This boiling vat, located adjacent to a field mechanic's shop, offers a solution to many parts cleaning problems.

The vat itself is made from scrap tank steel, and the traveling hoist and I-beam are supported on junk pipe piers. In cleaning some engine parts or valves removed from service for repairs, it is often necessary to boil the part in cleaning solution. A

The Three Oilfield R's
RIGHT ANSWERS
RIGHT UNITS
RIGHT USES



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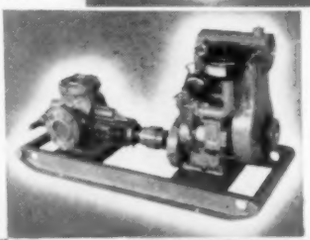

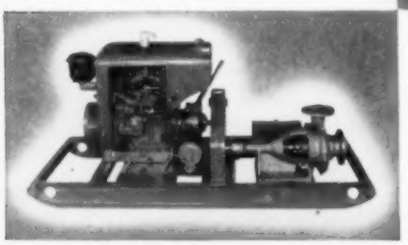

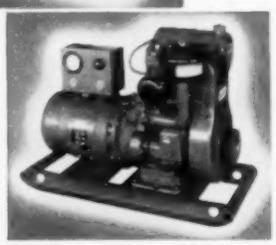

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Width	15"
Depth	14½"
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Motor	¼ HP 110 volt
Dia. of lapping plates	9"
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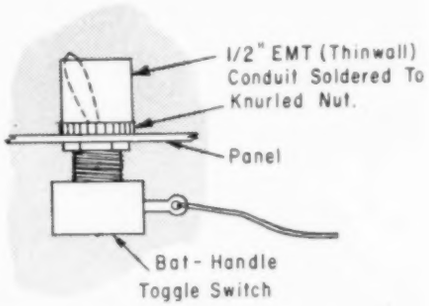
chain hoist is used to lower the object into the vat, and onto a screen in the cleaning solution. A gas burner, fed from the volume tank and regulator at the extreme right, keeps the cleaning solution at the desired temperature.

A cross arm, welded to the exhaust stack, supports a counter balance for the sheet steel lid. The I-beam supporting the chain hoist can be extended into the interior of the shop, to transport engine blocks or valves inside for shop repairs.

This offers a neat appearing, labor-saving installation for district maintenance shops.



Toggle Switch Protector Prevents Battery Drainage

This inexpensive guard can prevent bat-handled toggle switches from being accidentally turned on, eliminating the drainage of batteries on battery-operated equipment. An accident of this nature can cause considerable inconvenience when essential equipment, such as "walkie-talkies," are out of operation when needed most.

A short length of thin-wall conduit is soldered to the knurled nut holding the switch. The conduit should extend to a point slightly below the end of the handle. This allows the switch to be easily operated by fingertip, but prevents many of the accidental blows against the handle.

Permanent Chock Attaches To Portable Pipe Rack

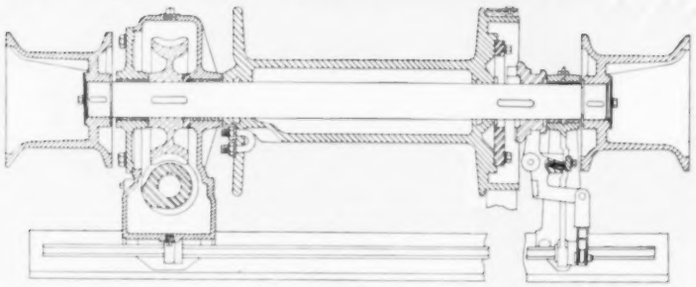
A readily available, permanent type chock can be attached to a portable pipe rack with short length of scrap chain. Weld a short section of discarded sucker rod into a "T" shape, and attach it to the rack with the chain.

The "T" fits into a hole burned in the top of the pipe rack. This assures the use of proper material instead of the makeshift boards, rags and scrap metal often used for chocks.

In addition to increasing the safety aspects of the installation, the chock is not liable to be lost, or left behind during moving.

BRADEN TRUCK WINCHES

Take a Look INSIDE!



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BRADEN Winches are made for back-of-cab or front-end mounting and range in capacities from 6,000 to 100,000 pounds. Specify BRADEN Truck Winches . . . and be sure!

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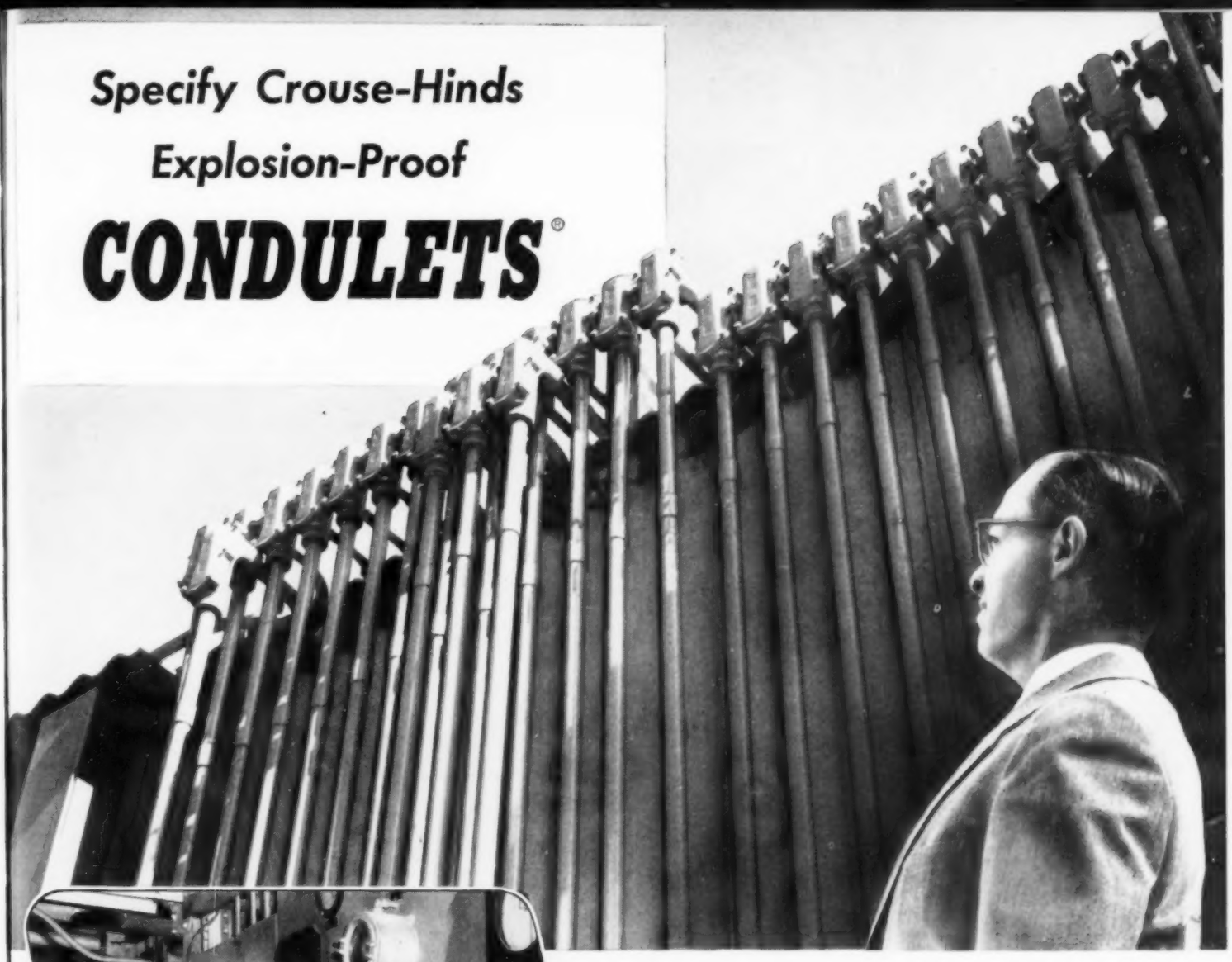

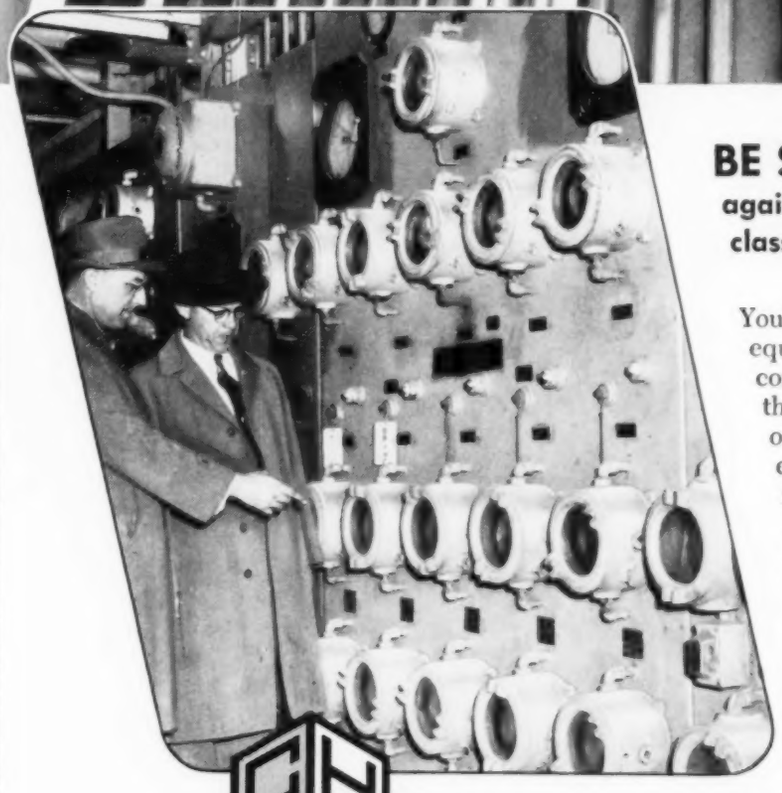

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Pipe Line Men

IN THE NEWS

Barney Laulhere

R. J. Lyons

Hood Construction Company and **Corrosion Engineering Corporation** have entered into a working agreement to utilize services of each. Hood Construction Company is engaged in installation of gas and oil distribution and gathering lines in California, the Northwest and the Rocky Mountain states. Corrosion Engineering developed a method for the internal coating of gas, oil and water lines in place using an epoxy-type resin. The two firms will maintain headquarters in Hood Construction's recently completed building and yard at Los Nietos, Calif., and will have district offices at San Diego; Wichita Falls, Texas; Tacoma, Wash.; and Magnolia, Ark. **Barney Laulhere** is president and manager of Hood Construction Company and **Ross J. Lyons**, president of Corrosion Engineering Corporation.

•

Tom P. Walker

E. Clyde McGraw

Transcontinental Gas Pipe Line Corporation directors named **Tom P. Walker** to the newly-created position of chairman of the board and elected **E. Clyde McGraw** to succeed him as president and chief executive officer of the company. Walker has been president of Transcontinental for the past four years. Previously he was with Irving Trust Company of New York as a vice president in charge of its Utility department. Prior to that, he served as an executive of several public utilities, including the presidency of Gulf States Utilities Company. McGraw, executive vice president of Transco since 1955, has been associated with the company since its beginning, serving first as operating vice president.

•

John O. Holder, Tulsa, was named president of the **Petroleum Industry Electrical Association** in Houston in April. He succeeds **H. A. Rhodes**, Houston, who becomes chairman of the board. New president of **Petroleum Electric Supply Association** is **John E. Metzenthin**, Dallas, succeeding **R. J. Smith**, Dallas, who becomes board chairman. Other PIEA officers are **E. H. Wilder**, Beaumont, vice president; and **E. B. Dunn**, Philadelphia, secretary-treasurer. Directors for the coming year are Rhodes, **Tom B. Kelley**, Shreveport; **D. R. Wofford**, Owensboro, Ky.; and **A. E. DeMattei**, San Francisco. PESA officials are **Douglas Ball**, Houston, vice president; **Pat King**, Dallas, executive secretary-treasurer; and directors include **T. W. Sharpe**, Dallas; **H. C. Shelton**, Tulsa; **Ralph Asbury**, Houston; **C. A. Gunn**, Dallas and **Pat Wilson**, Houston.

•

Coastal Transmission Corporation has announced three personnel appointments. **H. L. Wilhite**, formerly with Delhi-Taylor Oil Corporation, has joined Coastal as manager of gas supply. **J. R. Wait, Jr.**, formerly chief engineer with Houston Pipe Line Company, is now Coastal's chief engineer. **Russell N. Harvey**, Coastal's manager of right-of-way, formerly was with Trunkline Gas Company.

•

Charles F. Guinn, superintendent of **Tidal Pipe Line Company**, and **Otis R. Tisdale**, chief engineer, have retired from service with the firm. Guinn has been with Tidal for 31 years. Tisdale joined the company in 1929.

•

D. T. Lutz has been appointed superintendent of compressor stations at Malvern, Ark., for **Texas Illinois Natural Gas Pipeline Company**. Lutz succeeds **H. E. Jacobsen**, who has joined Western Pipe Line Inc. in Austin, Texas. Lutz was superintendent of the company's compressor station at Stinnett, Texas, before his new appointment.

•

Texas Eastern Transmission Corporation has completed the transfer of the headquarters of the company's Gas Reserve and Supply section from Shreveport to permanent offices in Houston. In addition to **Mills Cox**, vice president in charge of gas supply, officials in the new office include **John C. Jacobs**, vice president of Texas Eastern and executive vice president of Texas Eastern's gas gathering subsidiary, Wilcox Trend Gathering System, Inc., **Jack D. Head, M. J. Popovich** with a staff of ten gas reservoir engineers; **Bill Kendall, J. H. Weyland, Morgan Bodkin** and **Harvey Karpe**. A portion of the company's Gas Purchase section under the direction of **John Adams** will continue to maintain offices in the general office headquarters in Shreveport.

•

Earl W. Unruh, formerly vice president—operations of **Sinclair Pipe Line Company**, has been elected president and chairman of the executive committee. Unruh succeeds **William H. Morris** in both positions. Morris recently became vice president of Sinclair Oil Corporation.

Earl W. Unruh

G. M. Johnson, formerly vice president—crude oil lines, will succeed Unruh and **J. D. McConnell**, formerly director of engineering, succeeds to Johnson's post. **C. M. Cotten**, auditor, and **C. F. McCoy**, vice president, have been elected to the pipe line company's board of directors.

•

Four Corners Pipe Line Company has announced election of officers and directors. **R. G. McIntyre** is president of the newly organized firm. Other officers of the company are **J. L. Irvine**, Houston, vice president; **C. C. Combs**, New York, vice president and assistant treasurer; **R. J. Northway**, Houston, secretary and assistant treasurer; **J. H. O'Hare**, Houston, treasurer and assistant secretary; and **C. M. Wright**, New York, assistant secretary.

Elected directors were **T. A. Van Griethuysen**, Houston; Irvine, Houston; **R. D. McGranahan**, Pittsburgh; **D. E. Day**, Los Angeles; **D. B. Hodges**, New York; **A. G. Schei**, New York; **G. A. Davidson**, San Francisco; **F. C. Loomis**, San Francisco; **S. H. Durkee**, Los Angeles; and McIntyre, Houston.

•

Wayne W. Melton has been promoted to main line chief engineer for Magnolia Pipe Line Company at Foreman pump station, Arkansas. **T. S. Greenlee** has been assigned as main line chief engineer at Waelder pump station, Texas.

•

Paul Kayser, president of El Paso natural Gas Company, has been elected chairman of the board of directors of **Pacific Northwest Pipeline Corporation** and an officer and director of several other companies in which Pacific Northwest has interests. He succeeds Ray C. Fish, who continues as a director of the corporation. **Howard Boyd**, vice president and assistant general counsel of El Paso Natural Gas, has been elected vice chairman of the Pacific Northwest board, succeeding **C. R.**

New and More Valuable Rule-of-Thumb Notebook

Future issues of PIPE LINE INDUSTRY will carry more detailed engineering data sheets in addition to the time-saving Rules of Thumb. This expanded feature will include graphs, charts, data tables and nomograms selected to help you solve engineering, design, construction and operating problems. For each acceptable illustrated one-page contribution, PIPE LINE INDUSTRY will pay $25. Send us your favorite. Rules of Thumb are still being accepted at regular payment of $15 each. (See Page 57 for this month's Rule of Thumb feature.)

Sun Pipe Line Company's new 110-mile line of NATIONAL SEAMLESS doubles delivery capacity to vital Newark-New York area.

10,951 tons of 14" National Seamless Pipe — varying in wall thickness from ¼" to ½" —now enables Sun Pipe Line Company to double its delivery to its Newark plant. The new pipeline also saves time, because it largely eliminates the need for water transportation from Twin Oaks, Pa., into crowded New York Harbor.

Requiring only one pump station, at Twin Oaks, better than 83,000 barrels of gasoline or 65,000 barrels of fuel oil can be handled every day. The new 14" pipeline replaces Sun Pipe Line Company's old line . . . also constructed of National Tube pipe. It crosses three major rivers, the Schuylkill, Delaware and Raritan. These underwater portions of the line utilize the ½" wall sections, where extra stress and strain are exerted. But withstanding extra-rough conditions is "old hat" to National Seamless Pipe . . . its reputation for accomplishing difficult tasks is well established.

National Seamless Line Pipe combines the characteristics of high strength, extreme flexibility, and uniformity, with superior welding properties, to assure the user of many years of satisfactory service.

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In Pipelines Too . . . Seamless Does It Better

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USS

UNITED STATES STEEL

Williams, who remains a member of the board of directors. Kayser and Boyd's election to board memberships followed resignations of **Robert R. Herring** and **Norman V. Kinsey. Stuart F. Silloway** continues as president of Pacific Northwest.

•

D. R. Turner has joined the firm of **Ehrhart & Associates, Inc.,** Los Angeles and San Francisco engineers and constructors, as project manager. Turner comes to the firm from Tulsa, where he was engaged in management of contract engineering and construction projects performed for the oil and petrochemical industry. He will be located at the company's main office in Los Angeles.

Glen F. Graves has been promoted to superintendent of the Right-of-Way department at **Trunkline Gas Company** of Houston. Graves has been with Trunkline since 1950 when the company was organized and participated in the acquisition of the right-of-way for the company's 1200 mile gas pipe line. Before joining Trunkline, Graves was with Texas Gas Transmission Corporation for two years, and worked for Texarkla Oil Company while attending college in Shreveport.

Glen F. Graves

•

Robert E. Stiles, pipe line engineer, has recently accepted the position of general manager with **Emmett F. Lowry Construction Company,** Pipe Line department in Texas City, Texas. The department will specialize in laying main lines, lateral lines and distribution systems as well as refinery piping. Stiles has worked with leading pipe line contractors and formerly operated Stiles Construction of Charleston, W. Va.

•

Signal Oil and Gas Company has named **Harvey Menard** as manager of operations of the Gas department. Menard has been general superintendent of the Gas department. Joining Signal as manager of engineering and construction in the Gas department is **David R. Arnold.** Formerly manager of manufacturing for Guy T. Martin & Co., Inc., Arnold was assistant superintendent of the Manufacturing and Sales department of Superior Oil Company. **Marvin S. Winders** also has joined Signal as mechanical engineer for the company's Gas department. Previously he was with Natural Gas Pipeline Company of America and its affiliate, Texas-Illinois Natural Gas Pipeline Company.

•

C. B. Ames has been named president of **Fish Engineering Corporation,** Houston, and **Ray C. Fish** became chairman of the board for the engineering and construction firm. Ames, formerly vice president of Fish Engineering, was one of the original founders of the firm in 1946. He has directed engineering, design and construction operations on projects for the oil, gas and chemical industry.

C. B. Ames

Fish-Northwest Constructors Inc., headed by **R. D. Ricketts,** will continue to direct construction activities. Fish Service Corporation will specialize in feasibility and design studies for the gas utility industry directed by **R. R. Herring.**

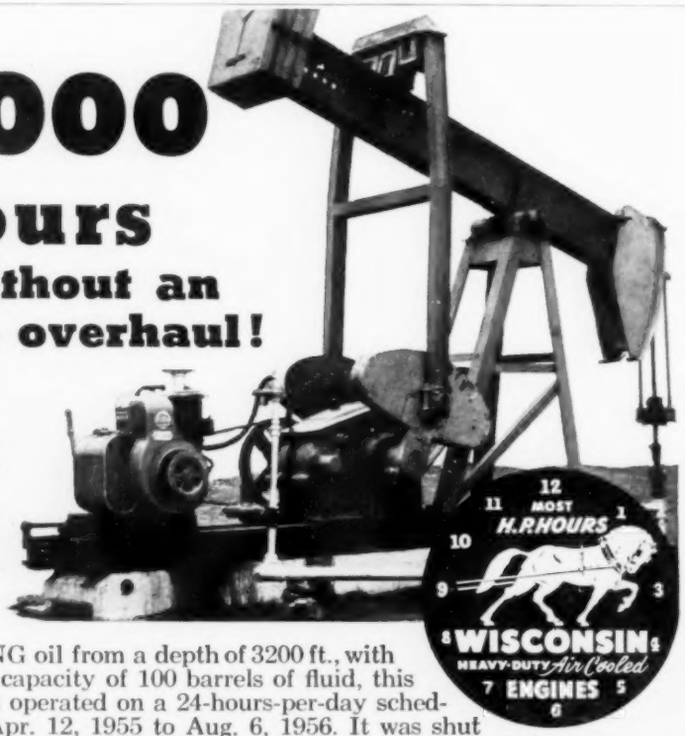
•

R. T. Widney of Bartlesville, Okla., has been appointed superintendent of gas operations for **Cities Service Oil Company's** Production division. Widney joined Cities Service in 1948 and since 1954 has served as special engineer handling gas production, drilling, proration and gas sales contracts.

•

William H. Wildes, president of **Republic Natural Gas Company,** has been named chairman of the board and **C. D. Miller,** vice president, was elected to the presidency. Wildes has been president since the firm's incorporation in 1934. Miller, who recently joined Republic, was formerly associated with Harper-Turner Oil Company and with British-American Oil Producing Company.

11,000 hours without an engine overhaul!



• This Model TFPD Wisconsin Air-Cooled Oil Well Pumping Engine was operated practically continuously for a total of 11,000 hours (the equivalent of approx. 75,240 hp. hours, operating at 1800 rpm., 60% loaded) . . . verified by the sworn statement of the supervising oil field foreman.

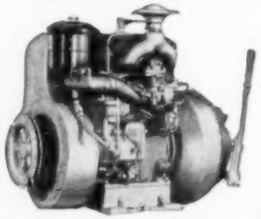
PUMPING oil from a depth of 3200 ft., with a daily capacity of 100 barrels of fluid, this engine was operated on a 24-hours-per-day schedule from Apr. 12, 1955 to Aug. 6, 1956. It was shut down only for such ordinary maintenance as changing lubricating oil, spark plugs and magneto points.

When this engine was brought to the shop for inspection and possible repairs, after its grueling 11,000-hour oil well pumping assignment, the shop mechanics were surprised to find the valves in excellent condition, needing only slight grinding. Piston pins were not worn enough to need changing and cylinder walls were still in condition to permit the use of standard rings. Even the connecting rods showed practically no wear. After minor repairs the engine was put back on the job, pumping the same well, and is still going strong!

Here is tangible proof of Wisconsin Engine heavy-duty stamina and basic *High Quality* design and construction in all details . . . including such features as tapered roller main bearings, Stellite exhaust valves and valve seat inserts, in combination with positive type valve rotators, and many other outstanding service advantages.

You can't do better than to specify "Wisconsin Power" for your equipment.

Model TFPD Wisconsin Oil Well Pumping Engine



Get the details about this 2-cylinder Wisconsin Heavy-Duty Air-Cooled Oil Well Pumping Engine, with built-in HIGH MOMENTUM FACTOR.

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When Bucyrus-Eries Move In

Trenching for a 24-in. natural gas pipeline in northern Pennsylvania near Honesdale is this Bucyrus-Erie 22-B dragshovel. The high pace this machine has set for its owner, Oklahoma Pipeline Constructors, Dallas, Tex., is characteristic of the features that have made Bucyrus-Erie dragshovels outstanding.

There's high speed on the hoist and swing as well as full digging power for heaped, quick-filling loads. The cambered boom provides added clearance for digging deep trenches, makes dumping easy because dipper can be raised high and brought in close without spilling the load. The dipper has sloping sides and extended lip area for clean loading and dumping.

Tractor-type crawler mounting is available, too, for top mobility. It raises ground clearance enough to travel over rocks, stumps, and most other obstructions. Deep grousers on the tractor-type treads provide sure traction in soft ground and permit the machine to climb steep grades. Special seals protect track-roller bearings against damage from water, dirt, and grime.

For more information on the high-output features of Bucyrus-Erie ½-yd. 15-B, ¾-yd. 22-B (both available with tractor-type crawlers), and new 1-yd. 30-B dragshovels, see your Bucyrus-Erie distributor today.

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DRESSER-IDECO COMPANY, Columbus, Ohio — Radio and television broadcasting towers, steel buildings, aircraft hangars, electric power substations.

DRESSER MANUFACTURING DIVISION

DRESSER MANUFACTURING DIVISION, Bradford, Pa. — Pipe line couplings, pipe repair sleeves and clamps, weldments, forgings, welding fittings, flanges, rings.

GUIBERSON — SAFE THAN SORRY — BETTER BE

THE GUIBERSON CORPORATION, Dallas, Tex. — Swabs, packers, anchors, workover equipment — drilling heads, blowout preventers, tubing blocks, hooks, swivels, kellys, savers, unions. Gas lift equipment. Molded rubber products

LANE WELLS

ANE-WELLS CO., Los Angeles, Calif., ouston, Tex., Oklahoma City, Okla.— lectric and Radioactivity Well Logging, oneshot* perforating, bullet per- orating, packers, bridging plugs.

Magcobar.

MAGNET COVE BARIUM CORP., Houston, Tex.—Magcobar* and Magcogel* drilling muds and other specialized oil well drilling fluids and chemicals.

PACIFIC

PACIFIC PUMPS, INC., Huntington Park, Calif. — Centrifugal pumps for refineries, power stations, pipelines, and chemical plants; plunger pumps for oilwells.

ROOTS RC SINCE 1854 CONNERSVILLE

ROOTS-CONNERSVILLE BLOWER DIVISION, Connersville, Ind.—Rotary positive blowers, gas pumps, centrifugal blowers, exhausters, vacuum pumps, and positive displacement meters.

SIE

OUTHWESTERN INDUSTRIAL ECTRONICS CO., Houston, Tex.—Seis- graph systems and instruments— ctronic, electro-mechanical. Com- ters—analog and digital; recording tems. Special transformers, reactors.

* Trademark reg ste

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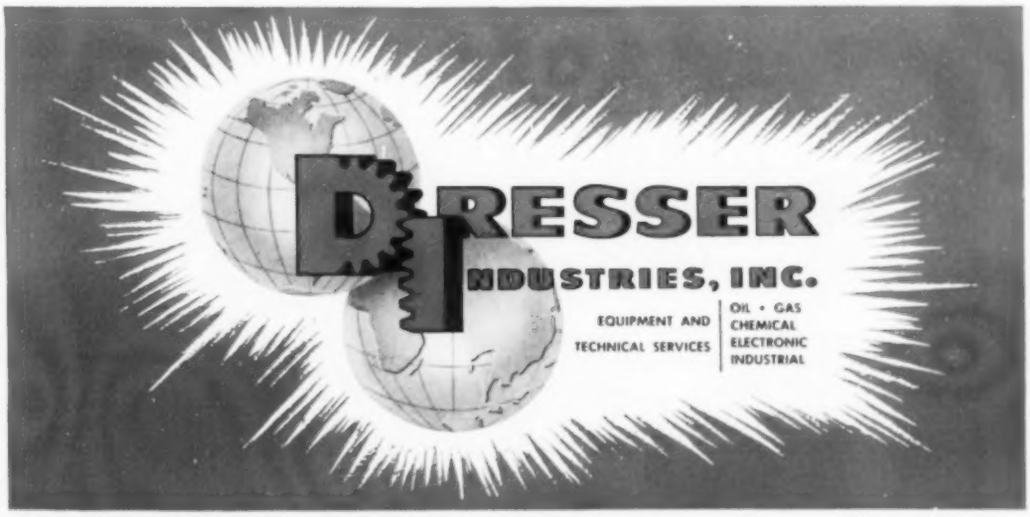
ECURITY ENGINEERING DIVISION, allas, Tex., Whittier, Calif. — Rock its, reamer rock bits and hole peners; reamers, casing scrapers nd Neo-Red rubber stabilizers.



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WHO'S MEETING WHERE

May

4th Annual Conference for Engineers & Architects, College of Engineering, Ohio State University, May 3.

API Annual Pipe Line Conference, Cleveland Hotel, Cleveland, May 6-8.

Fluid Control Institute, Greenbriar, White Sulphur Springs, W. Va., May 8-11.

AGA-PCGA Gas Supply, Transmission and Storage Conference, Mark Hopkins Hotel, San Francisco, May 8-10.

Liquefied Petroleum Gas Association, Conrad Hilton Hotel, Chicago, May 12-15.

API Safety and Fire Protection Committees, Hotel President, Kansas City, Mo., May 13-17.

American Right-of-Way Association, 3rd Annual Seminar, Conrad Hilton Hotel, Chicago, May 16-17.

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DIRECT WEIGHING
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ASME, 29th Annual Conference and Exhibit of Oil and Gas Power Division, Kentucky Hotel, Louisville, Ky., May 20-23.

NACE, Northeast Region, in cooperation with NACE's Central New York Section, Syracuse University, Syracuse, N. Y., May 20-22.

Southern Gas Association, Short Course on Gas Technology, Texas College of Arts & Sciences, Kingsville, Texas, May 29-31.

June

Petroleum Electric Power Association, Annual Conference, Amarillo, Herring Hotel, June 3-5.

Appalachian Underground Corrosion Short Course, West Virginia University, Morgantown, W. Va., June 4-6.

ASME, Semiannual Meeting, Sheraton-Palace Hotel, San Francisco, June 9-13.

ASTM, Chalfonte-Haddon Hall, Atlantic City, N. J., June 16-21.

Association for Computing Machinery, 12th Annual Meeting, Houston, June 19-21.

Canadian Gas Association, 50th Annual Meeting, Jasper Park Lodge, Ontario, June 23-27.

Michigan Gas Association, Grand Hotel, Mackinac Island, Mich., June 24-25.

American Institute of Electrical Engineers, Sheraton-Mt. Royal Hotel, Montreal, Canada, June 24-28.

September

Electrical Conference of the Petroleum Industry, AIEE Petroleum Industry Committee, Penn-Sheraton Hotel, Philadelphia, Sept. 9-11.

National Petroleum Association, 55th Annual Meeting, Traymore Hotel, Atlantic City, N. Y., Sept. 11-13.

12th Annual Instrument-Automation Conference and Exhibit, Auditorium, Cleveland, Ohio, Sept. 11-15.

ASME, 12th Annual Petroleum Mechanical Engineering Conference, Mayo Hotel, Tulsa, Sept. 23-25.

October

Texas Mid-Continent Oil & Gas Association, 38th Annual Meeting, Texas Hotel, Fort Worth, Oct. 1-2.

NACE, North Central Region, Sherman Hotel, Chicago, Oct. 1-4.

NACE, South Central Region, City Auditorium, Oklahoma City, Oct. 1-4.

American Gas Association, Kiel Auditorium, St. Louis, Mo., Oct. 7-9.

AIEE, Morrison Hotel, Chicago, Oct. 7-11.

NACE, Western Regional Conference, U. S. Grant Hotel, San Diego, Oct. 22-24.

November

API, 37th Annual Meeting, Conrad Hilton Hotel and Palmer House, Chicago, Nov. 11-14, 1957.

Youngstown

OFFERS THE "BIG 5" IN ELECTRIC WELD LINE PIPE FOR OIL AND GAS PRODUCING AREAS. . .PROVEN AND READY FOR EFFICIENT SERVICE IN THE FIELD

Here are the "Big 5" reasons why Youngstown Electric Weld Line Pipe is your best buy:

1. It bends readily
2. Wall thickness is uniform
3. Line up characteristics are excellent
4. Weldability is outstanding
5. Long lengths save you time and trouble

Terrain dictates some mighty peculiar contours. As an oil or a gas man, you're well aware of this. But, are you also aware of the secret of bendability of line pipe? It's simply the right combination of physical and chemical properties. Youngstown Electric Weld line pipe manufactured from uniform high quality steel, is capable of producing even smooth bends to fit any contour with uniform roundness. You know the importance of this—you know what this means on any job.

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What's Happening

AMONG SERVICE AND SUPPLY MEN

J. E. Swanson

E. N. Gosselin

Gosselin and Swanson Head Graver Tank & Mfg. Co.

Directors of Graver Tank & Mfg. Co., Inc. have elected E. N. Gosselin chairman of the board and J. E. Swanson president.

Gosselin has been president of Graver since 1930. Under his direction, the company has grown from a single plant to a five-plant operation, with nationwide services in steel and alloy fabrication and erection.

J. E. Swanson started as foreman in the East Chicago plant and has served in the shops, in sales and in management. He has been executive vice president since 1948.

These new appointments cover Graver's two divisions as well—water conditioning and oil field equipment—and its subsidiary, Graver Construction Co., Inc. Founded in 1857, Graver will celebrate its centennial this year.

Boersig Receives Promotions With General Electric

Edward L. Boersig, Carboloy cemented carbide cutting tool representative in the Buffalo area for General Electric's Metallurgical Products department, Detroit, has been named manager of component sales. He will assume his new duties in the Motor City immediately.

A veteran of 15 years with General Electric, Boersig, prior to his Buffalo assignment, served the organization as an instructor in its customer training school, and as a carbide sales representative in both Michigan and West Coast areas.

Burgess-Manning Company Promotes W. A. Carroll, Jr.

Burgess-Manning Co., has announced the appointment of W. A. (Bill) Carroll, Jr., as general sales manager of the Industrial Silencer division. Carroll has served as New York district manager of the company for several years and takes up his new duties with a broad experience in the field of silencing exhaust and intake noise from engines, compressors, blowers and pressure reduction systems and pulsation elimination in gas pipings.

W. A. Carroll, Jr.

Carroll's new office is essentially a part of the expansion program of Burgess-Manning Co., and he will headquarter in the Dallas office, assuming the sales responsibilities which were previously under the direction of Paddock.

Also announced is the promotion of R. T. Oliver, Jr., of the New York office to district sales manager to replace Carroll. Oliver will be supported by John R. Parsons who recently joined the Burgess-Manning organization in New York.

Thompson Named Supervisor With International Harvester

Warren H. Thompson has been named general supervisor, Sales Development section, Construction Equipment division, International Harvester Co.

Thompson has held the post of assistant general supervisor in sales development since December, 1954. Previously, he was a sales consultant in that department. Before joining the Harvester organization, Thompson was affiliated with several large contractors.

Camblin Completes 21 Years With Tretolite Company

L. C. (Curley) Camblin, refinery service engineer for the Tretolite Company, Division of Petrolite Corporation has retired from active duty after 21 years of service.

L. C. Camblin

Camblin is a veteran in the industry, having begun his oil activities with the Gypsy Oil Company (now Gulf Oil Corporation) in 1910. He joined the Tretolite Company in 1936, first serving as a field engineer in northern Oklahoma and eastern Kansas. In 1945, he was transferred to the Refinery Service department, and has been active in this work in the Kansas-Oklahoma area until his retirement. His district of operations will now be taken over by his son, L. C. (Bud) Camblin, Jr. He will also make Tulsa his residence and headquarters.

Mason Neilan Announces 3 Field Sales Appointments

Six new appointments in three field sales organizations of Mason Neilan, Division of Worthington Corporation, have been announced.

In the East, Robert O. Smith moves into the position of New York district manager, with responsibility for sales of complete Masoneilan product line. In addition, Allan Gilchrist, formerly of Peabody Engineering Co., joins the New York office in a sales engineer capacity.

Additions to the Mason Neilan Chicago office are Robert Nickerson, transferred from headquarters in Norwood, Mass., and John Mattes, Jr., having newly joined Mason Neilan as a sales engineer.

On the West Coast, Mason Neilan has added Harry Mattes and David Willardson to the Los Angeles sales engineer staff. Mattes was formerly with Bethlehem Supply Co., and Willardson with C. F. Brown & Co.

Malcolm Jones Is Plant Engineer For Kaiser Steel Corporation

Malcolm A. Jones is plant engineer at the Fontana steel plant of Kaiser Steel Corporation. Jones is in charge of plant engineering and is also responsible for the coordination with operations of the $113 million construction program currently being carried on by Kaiser Engineers Division of the Kaiser organization.

Malcolm A. Jones

He was formerly assistant chief engineer at the Lackawanna, New York plant of the Bethlehem Steel Company from 1939 to 1956.

R. E. Burton Appointed To New Koehring Post

Raymond E. Burton, assistant sales manager for Koehring Division, Milwaukee, has been appointed to the new post of assistant director of marketing for Koehring Company. New duties of Burton will cover both market research and analysis.

R. E. Burton

Burton started with the Koehring organization as a draftsman at the C. S. Johnson Co., Champaign, Ill., (a Koehring subsidiary) in 1948. In 1952 he transferred to Tokyo as Koehring representative for Ishikawajima-Koehring Ltd., producer of Koehring equipment for the Asian area. He returned to assume the sales position in July, 1955.

Glauser Heads Staff Of Staytite Company

Newly elected officers of the Staytite Company in Houston are H. J. Glauser, Jr., president; F. G. D. Muller, vice president; Wharton E. Weems, secretary; and C. C. Glauser, treasurer.

Republic Flow Meters Company Acquired by Rockwell Firm

Rockwell Manufacturing Company has acquired the assets of Republic Flow Meters Company of Chicago. Present management of Republic will remain unchanged with James D. Cunningham, founder of the company, continuing as president. W. F. Crawford, president of

more than 350 pipeline stations are completely ELECTRIFIED . . .

WHY? Because Low Cost Purchased Electric Power handles the biggest jobs — pipe lines or multiple pumps — with trouble-free efficiency. Regardless of the job, Electric Power is your best bet. Operators of pipeline stations have found that for whatever the job . . . Electric Power gives them the advantages of low operating, maintenance, and labor costs . . . fast starting in all weather . . . and automatic control systems. Yes, with Electric Power . . . you get big savings.

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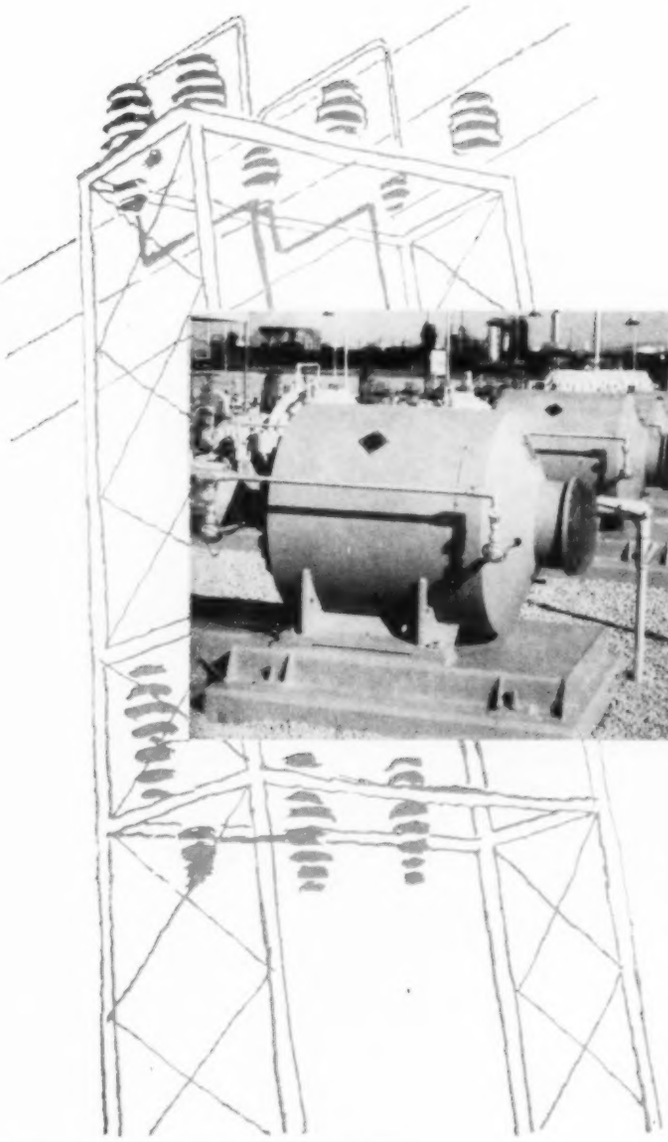
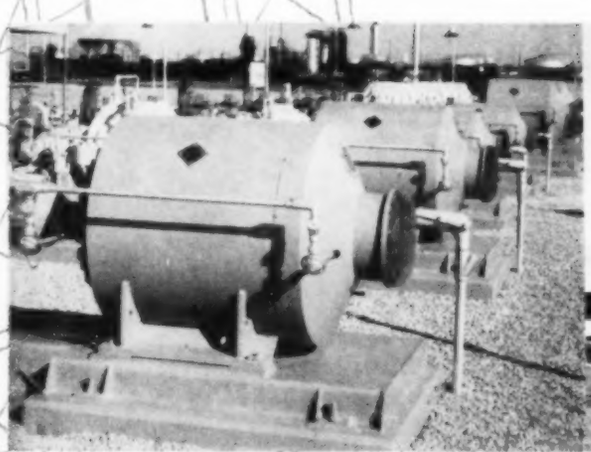
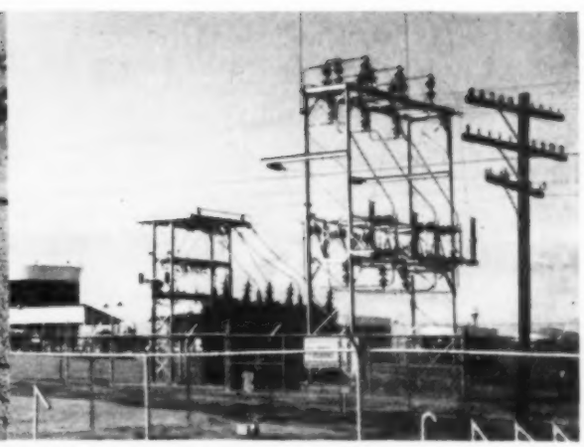






PETROLEUM ELECTRIC POWER ASSOCIATION

P.O. Box 2771, Dallas, Texas

Edward Valves Inc., a Rockwell subsidiary, will be associated with the Republic management in Chicago.

A. O. Smith Appoints Hortvet Chief Engineer

Douglas R. Hortvet has been appointed chief engineer of the A. O. Smith Corporation of Texas. Hortvet formerly was assistant chief engineer.

A. R. Schneller has been named sales manager of welding products and accessories for the Welding Products Division of the A. O. Smith Corporation.

Schneller's previous post as eastern regional sales manager for welding products has been taken over by D. H. Buerkel, who formerly was sales representative in the Philadelphia area.

Roland A. Warns

Edward J. Bodette, Jr.

L.O.F. Glass Fibers Names Warns and Bodette to Posts

Roland A. Warns has been appointed an industrial engineer with L.O.F. Glass Fibers Company and Edward J. Bodette, Jr. has been appointed a field representative in the Detroit area.

A management trainee with the firm for the past six months, Warns previously was associated with Surface Combustion Corporation. Bodette was associated with the Quaker Rubber Company, Philadelphia, and the Ohio Belting and Transmission Company, Toledo, before joining the firm.

Grayson Is Controller For J. I. Case Company

John D. Grayson, former vice president and treasurer of American Tractor Corp., Churubusco (Ft. Wayne), Ind., has been named controller of the J. I. Case Co. American Tractor recently merged with Case, which is entering the industrial and roadbuilding equipment field.

John D. Grayson

According to John T. Brown, president of Case, "Grayson will take over responsibility for accounting and other functions falling within the scope of the controller's position."

Prior to joining American Tractor, Grayson was a divisional controller with Ford Motor Co. He is a certified public accountant in New York State and formerly was vice president and controller of the Magnavox Corp., Ft. Wayne, Ind.

W-K-M Appoints Tableman Assistant to Vice President

Glen A. Tableman has been appointed assistant to the vice president-marketing of W-K-M, Division of ACF Industries, Incorporated.

Glen A. Tableman

Tableman will be in charge of special projects for the Marketing division of the company. Tableman joined W-K-M in 1949 as a service man, was promoted to sales and service representative, and in 1951 was made district sales manager of the Dallas-Fort Worth area.

Read Named to Sales Post With Fisher Governor Co.

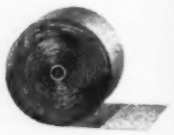
R. G. Read has been named Minneapolis district sales representative for Fisher Governor Company, Marshalltown, Iowa. His territory includes Minnesota and North Dakota and parts of Wisconsin and South Dakota.

R. G. Read

Read joined Fisher in 1948. After spending several years in the Marshalltown Sales department, he became associated with the Pittsburgh sales office. Read has been in Minneapolis since the first of February.

J-M Asbestos and Tar Felt

C-R-C Glass Wrap



C-R-C Outer Wrap

C R C

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Now you can fill all your pipeline needs from pipe wraps to pipe "pigs" from ONE supplier, Crutcher-Rolfs-Cummings, Inc.

C-R-C has chosen only the finest equipment and supplies for distribution to the pipeline industry. You have a choice, too:

15, 20, or 25 mil Glass Wrap
8 or 15 lb. J-M Felt
12 lb. Outer Wrap
2" to 36" O. D. Casing Insulators
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Manufacturers - Sales - Service

Cleaning and Priming Machines
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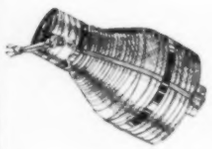
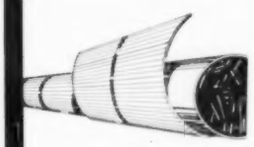
Electro-Hydraulic Line-Up Clamps
Vertical Pipe Benders
Koehring Excavators
Parsons Trenchliners
Esco Buckets and Teeth
C-R-C IMCO Bevelers
C-R-C Dope Kettles
T&R Holiday Detectors

Casing Insulators

Scraper "Pigs"



Casing Seals



Sealtight Rock Shield

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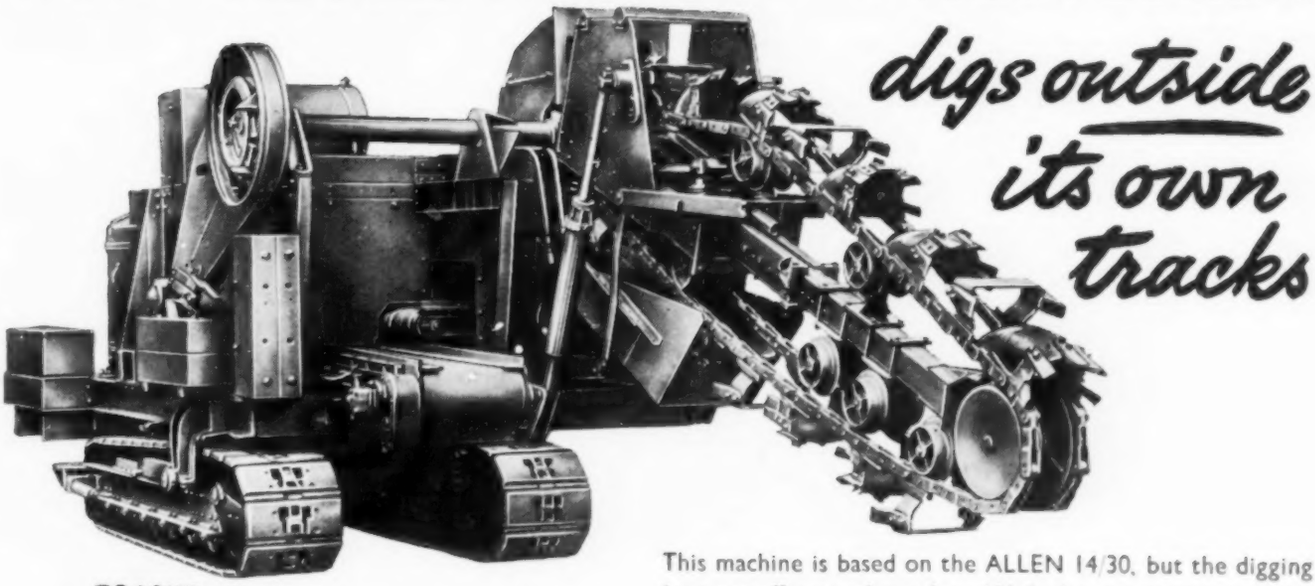
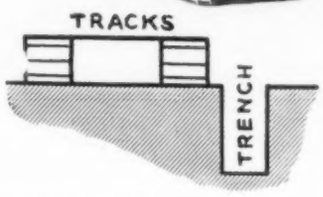
The ALLEN *OFFSET* TRENCHER



digs outside its own tracks



This diagram shows the position of the trench in relation to the tracks. The middle of the trench is 49 inches from the centre line of the machine.

This machine is based on the ALLEN 14/30, but the digging boom is offset to the right. With this arrangement trenches can be dug very close to obstructions, and in positions where no other trencher could be used.

With a side mounted boom there is considerable lateral stress when working. To withstand this the frame is constructed of massive steel channels, and the drive shaft mounted in a heavy tubular support. Trench widths range from 12-in. to 21-in. Maximum digging depth is 4-ft. 6-in.

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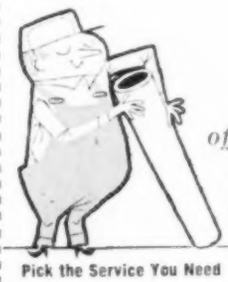

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Cement Mortar Lining of Interiors – Tate Process	..	X	X	4"	16"
Cement Mortar Lining of Interiors – Centriline Process	..	X	X	16"	144"
Centrifugal Spinning of Cement Mortar Lining of Interiors	X	..	..	4"	30"
Centrifugal Spinning of Coal Tar Linings of Interiors	X	X	..	36"	144"
Somastic Coating	X	X	..	½"	30"
Concrete Coating	X	..	..	4"	30"
Wrapping	X	X	..	4"	30"
Reclamation:					
Removal of Old Wrapping	X	X	..	2"	30"
Straightening	X	X	..	2"	30"
Blasting (Interior or Exterior)	X	X	..	2"	30"
Beveling	X	X	..	2"	30"
Roll Welding	X	X	..	2"	30"
Testing	X	X	..	2"	30"

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ON THE JOB CONSTRUCTION

CONCRETE RIVER WEIGHTS

Edwards Concrete River Weights installed on another major pipeline. Where volume permits, Allan Edwards, Inc., can construct river weights on the job-site, saving time and money. Other fine Edwards products include split welding sleeves, half soles and concrete marker posts.

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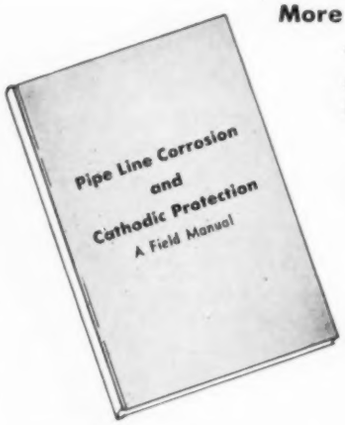
Allan Edwards, Inc.

2445 S. Jackson—P. O. Box 7218, Tulsa, Oklahoma
Phones: DI 3-7184 – DI 3-8390

More comments on this new Handbook:

"... a most practical on-the-job manual for men concerned with pipe line corrosion. We are ordering copies for each of our district engineers."



Pipe Line Corrosion and Cathodic Protection

By MARSHALL E. PARKER

This Handbook, written by Marshall E. Parker, consultant, is designed as a practical field manual. It is a 108-page pocket-size volume printed first as a popular series in WORLD OIL. The Handbook is illustrated with many charts and drawings and is completely indexed by subjects.

It presents comprehensive data on Soil Resistivity Surveys, Potential Surveys, Line Currents, Current Requirements, Rectifier Systems, Ground Bed Design, Magnesium Anodes, Stray Current Electrolysis, Interference in Protective Systems, Operations and Maintenance, and Coating Protection and Testing.

An appendix has been added of technical data on Underground Corrosion, Basic Principles of Cathodic Protection, Properties of Metals and Attenuation Equations. Order copies of this practical Field Manual now for each of your field men. Price $3.

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P. O. BOX 2608
HOUSTON 1, TEXAS

Jess F. Still

H. E. Alhart

Still and Alhart Made Managers For Mustang Tractor & Equipment

Jess F. Still has been named sales manager of Mustang Tractor & Equipment and Harold E. Alhart is manager of Mustang Tractor's newly created Engine division in Houston. Mustang Tractor is Caterpillar dealer for 35 counties in Texas.

Still, who joined the firm as full line representative in 1954, has been assistant sales manager the past year. Alhart has been associated with Mustang Tractor as engine representative for 4½ years.

Hall Names Turbine Specialist For General Electric District

Robert J. Hall has been named a turbine specialist for the General Electric Company's Central district which has its headquarters in Chicago.

Hall becomes the third turbine specialist to cover the district's area which includes the states of North Dakota, Minnesota, Wisconsin and parts of the states of Michigan, Indiana, Illinois, Iowa, South Dakota and Montana.

Hall worked for three years as an application engineer with the Taylor Instrument Companies, Rochester, N. Y., before joining the General Electric Co.

Following a short engineering assignment, Hall served in the marketing section of four of the Turbine Division's departments.

TRY A CLASSIFIED AD IN PIPE LINE INDUSTRY

Idle Equipment –
Idle Dollars!
Sell It Through a Classified
Ad in Pipe Line Industry.

QUICK
ECONOMICAL
RESULTFUL

Need Engineers – Technical Personnel? A Classified Ad will get them for you.

Cain to Head Sales Office For Berry Hydraulics

H. S. Cain has been appointed district sales engineer for Berry Hydraulics, a division of Oliver Tyrone Corporation. Cain will be responsible for the Texas sales territory, and will assist the division's sales engineers throughout the South. He will headquarter at 4046 Lemac Street in Houston.

H. S. Cain

Before being transferred to Houston, Cain was in charge of production and application engineering at the Corinth, Miss., plant, having joined Berry in 1955. Previous to that time he had been with Cities Service Gas Company as an engineer in the Compressor department, and a drilling superintendent at the McLouth, Kansas, storage project.

Jones & Laughlin Moves Sales Headquarters in New Orleans

Jones & Laughlin Steel Corporation's New Orleans district sales office is now an operation separate from the Jones & Laughlin Steel Warehouse.

New headquarters for the district sales office are in the Delta Building. The warehouse continues its operations at North Miro and Japonica Streets, under the management of Frank M. Harbison.

J&L had conducted its district office and warehouse activities jointly from 1931 until the recent separation. The New Orleans district covers Louisiana, Southern Mississippi, Southwestern Alabama and the western tip of Florida.

Hurlburt Is District Manager Of GE's Construction Materials

James S. Hurlburt has been appointed manager of General Electric Construction Materials division's Southwestern district. Hurlburt succeeds the late Charles W. Maledon.

Hurlburt has been with General Electric since 1934. Until his present appointment, he was a construction materials district representative in Washington, D. C. In his new position Hurlburt will direct field representatives and the marketing activities for the division's wire and cable, conduit and wiring device product lines.

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WANTED TO BUY

Used—10¾" OD - 12¾" OD - 14" OD and 16" OD - Plain End Line Pipe. Any amount—any location.

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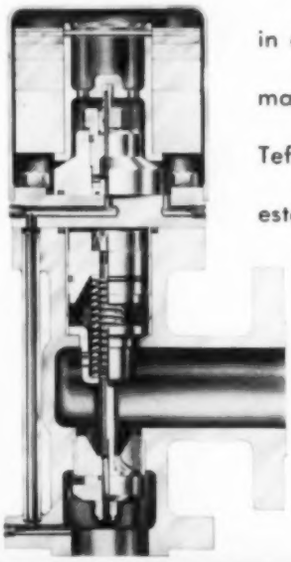
ANNOUNCING

THE NEW MODEL 412 KINZBACH PRESSURE RELIEF VALVE

The new, improved Kinzbach Model 412 relief valve for pipelines and refineries, has a ball seated pilot valve, usually dead weight loaded, but optionally spring loaded.

Eleven advantages are included in the design and operation of this new model:

1. Positive action — line pressure is utilized for opening and closing.
2. Dependable. Opening pressure is pre-set by application of dead weight or spring load.
3. Instantaneous opening to full capacity.
4. Automatic reseating.
5. No chatter or wire-drawing at seat.
6. Functional Testing. Hand lifting of pilot stem operates valve at **any** pressure.
7. Simple and rugged. Valve contains only two moving assemblies.



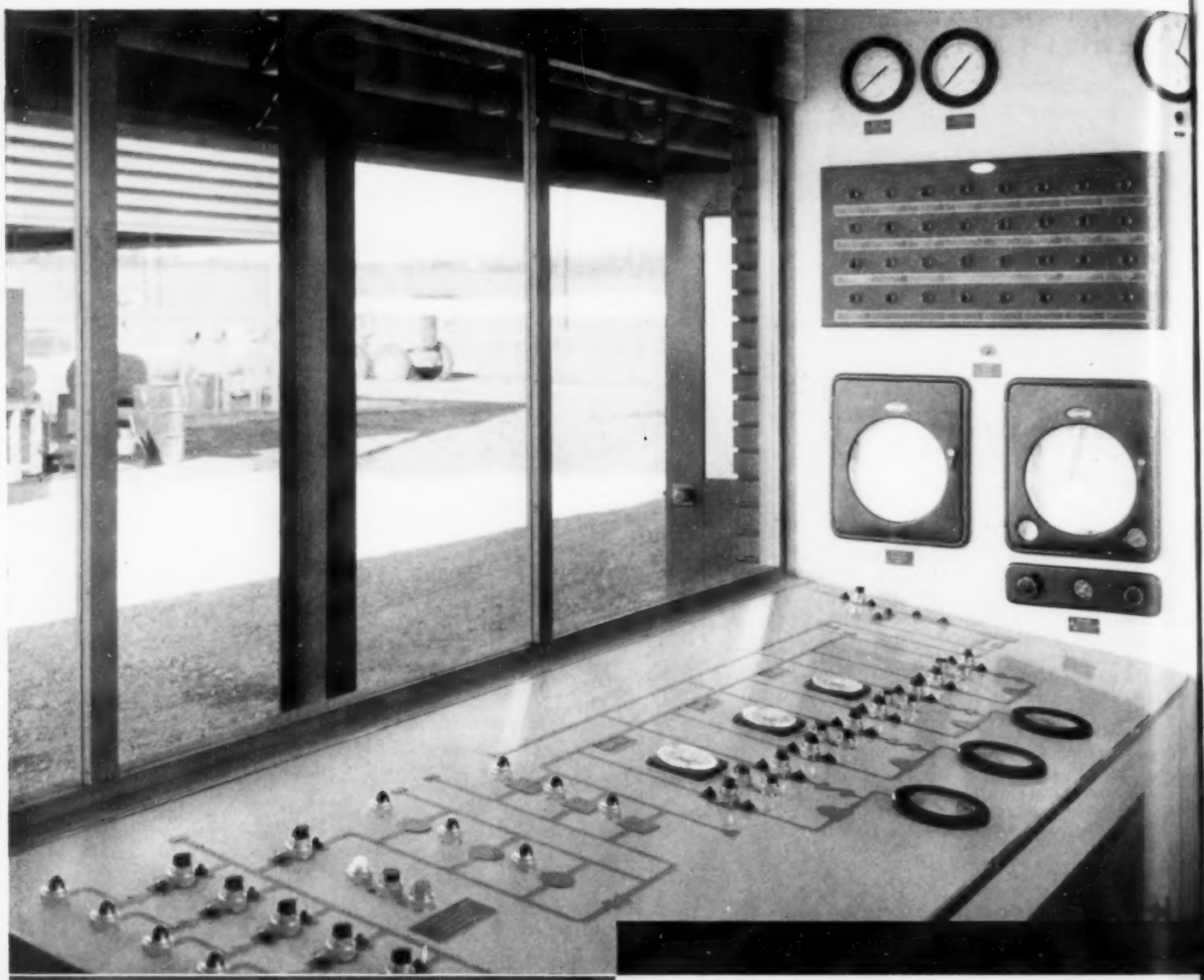
8. High capacity. Ample flow area provided in all sizes.
9. Positive Seating. Line pressure utilized to maintain valve shut.
10. Corrosion resistant. Full stainless trim with Teflon disk.
11. No pressure accumulation needed. Full lift established immediately.

Model 412 Valve sizes are 2", 3", 4", 6" and 8" with working pressures up to 1000 p.s.i.; pilots are available in four ratios: 5:1, 10:1, 25:1, and 50:1. For complete details on this and other Kinzbach pressure relief valves, write for new catalog.

KINZBACH TOOL CO INC

Export Office:
74 Trinity Pl. New York, N. Y.

KINZBACH TOOL CO., INC., P. O. BOX 277, HOUSTON, TEXAS



The control room at Watson, California, the first station on the Western Branch. On the panel at the right is a Masoneilan 60000 Series Dual Selector Controller, with manual subpanel, and a Pressure Recorder. All controllers and auxiliary instruments for all stations were supplied by Mason-Neilan.

One of 15 Masoneilan 10000 Series Control Valves installed on the new pipeline. This one is a main line valve equipped with a Series 7400 Positioner for accurate, positive positioning.

Masoneilan Controls Assure Dependable Performance of 846 Miles of S. P. Pipeline

All pumping and take-off stations on the new Southern Pacific petroleum products pipeline are completely equipped with Masoneilan Controls. The control systems were engineered by Mason-Neilan, working in close cooperation with Engineering Management, Inc., to provide accurate performance and year-round dependability.

This combination of engineering experience and high quality product assures Southern Pacific of years of satisfactory, economical operation with minimum maintenance — an assurance backed up by successful installations on many other pipelines in this country and abroad.

Mason-Neilan engineers are available to work with you on your pipeline control problems. Complete data on Masoneilan equipment is yours for the asking at our office nearest you — or write

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ALL HIGH Quality Coefficient Q PRODUCTS

Another Masoneilan
10000 Series Control Valve
used with a valve mounted Model 2707
Controller to control pressure
on a take-off line.

What's New in Equipment

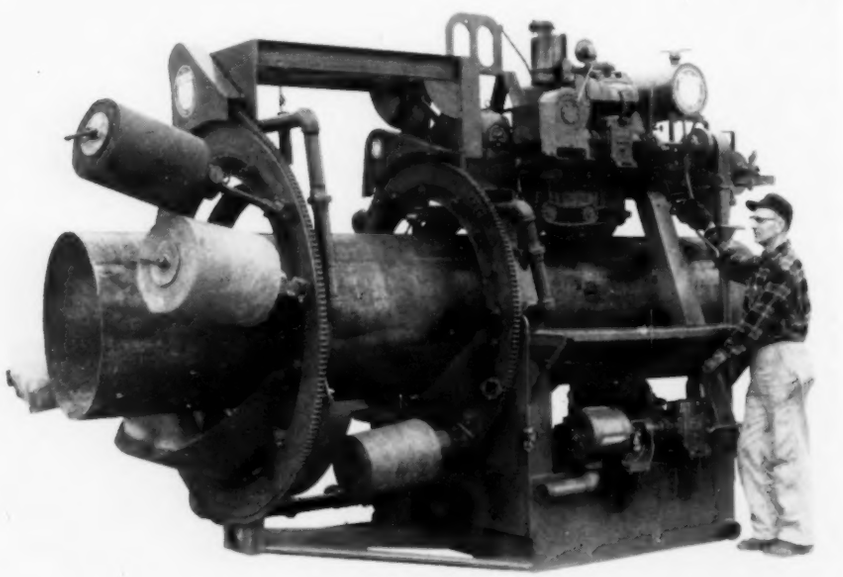
for the Pipe Line Industry

Shovel-Crane

The Thew Shovel Company has introduced the Lorain-85A a 2½ yard shovel-crane, in the Lorain line for 1957. The new cab has increased glass area for improved visibility and includes a sliding overhead sunshade and windows.

Lorain's two-lever "Joy-Stick" metered-air controls and "Shear Ball" mounting are two of the new mechanical features incorporated in this new model. Air control of crawler steering, locking pawls and travel jaw clutch is standard. All friction clutches have built-in air cylinders. The 85A is convertible to crane, shovel, clamshell, dragline or hoe.

For more data, circle **No. E1** on Readers' Service Card, last page this issue.



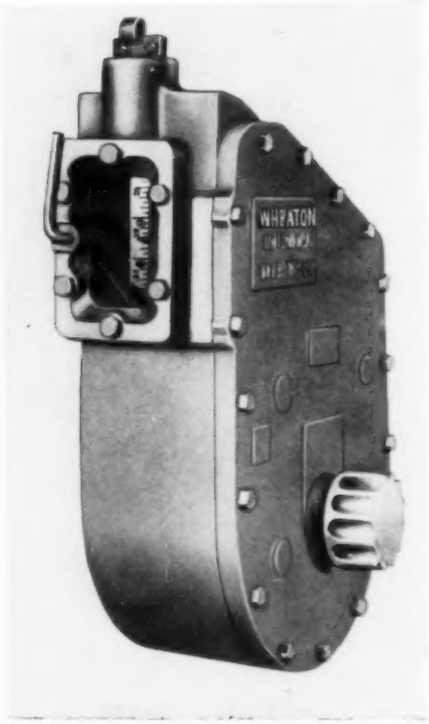
Traveling Machine

M. J. Crose Manufacturing Company, Inc. has announced a new line traveling machine for double coating and double wrapping pipe up to 40 inches in diameter.

The new Crose machine is outstanding for its flexibility—it will double coat and wrap pipe ranging from 30 to 40 inch diameters. Compact and relatively light in weight, it has a variable speed reducer to eliminate chains and sprockets, making it possible for a quick lap change and reducing maintenance costs.

(This item supplements M. J. Crose Manufacturing Co., Inc. data on page 1349 of the Composite Catalog, 21st Edition.)

For more data, circle **No. E2** on Readers' Service Card, last page this issue.



Tank Gage

A new line of fittings, designed especially for storage tanks, is now being manufactured by Wheaton Brass Works. The application of precision in the line is illustrated in Wheaton gage hatches, which provide automatic closing and vapor-tight sealing, effecting a definite reduction in evaporation losses. These hatches have a resilient seal in the cover, which not only cushions the impact of closing, but also provides positive tightness.

Other new tank fittings announced by Wheaton include screened free vents, breather vents, water drain valves and automatic tank gages.

(This item supplements Wheaton Brass Works data on pages 5115-5116 of the Composite Catalog, 21st Edition.)

For more data, circle **No. E3** on Readers Service Card, last page this issue.

TRETOLITE

to insure

the best service

possible...

TRETOLITE FIELD SERVICE ENGINEERS are located in New Orleans, Metaire, Lafayette, Lake Charles, Beaumont, Houston, Channelview and Corpus Christi—from these "ports," Tretolite Service engineers are always ready, via air or water, to help with production problems involving emulsification, internal corrosion, paraffin accumulation, scale deposition or housekeeping problems requiring oil-free decks and equipment.

ASK THE MAN IN THE RED AND WHITE PLANE
or the RED CAR

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DESALTING • DEMULSIFYING • CORROSION INHIBITING • SCALE PREVENTION

FUEL OIL ADDITIVES • WATER • DE-OILING • METAL DEACTIVATORS

TFO-57-1

For more data on advertised products, use Readers' Service Cards, last page.

Backhoe

The Charles Machine Works Inc. has announced a new low cost, portable powered backhoe designed to eliminate hand digging. This new machine is capable of digging to a depth of five feet for trenches, bell holes and excavations. The Ditch-Witch backhoe is a trailer unit and may be towed behind a car at normal road speeds. It weighs 500 pounds and has its own complete gasoline power unit and hydraulic system.

The Ditch-Witch backhoe is well suited for digging in soils where gravel and loose rocks are prevalent. The tool has been proved in digging sewer and service lines, bell holes for maintenance and connections on pipe lines and mains.

(This item supplements The Charles Machine Works data on page 1245 of the Composite Catalog, 21st Edition.)

For more data, circle **No. E4** on Readers' Service Card, last page this issue.

Safety Panel

For continuous protection and automatic operation of unattended or remotely-controlled engines as on irrigation pumps, oil rigs, air compressors, fork-lift trucks, etc., the Instrument Division of Stewart-Warner Corporation has announced new expandable safety panels that automatically shut off engines should oil pressure drop to a dangerously low level or engine water temperatures rise to a dangerously high point.

Available for both battery and magneto type ignitions as well as diesels, these new expandable panels include pre-cut holes for the insertion of a Stewart-Warner tachometer, Hobbs Hour Meter or other instruments or gages as needed in any particular installation to facilitate "clocked" maintenance or inspection.

Clogged oil lines, inoperative oil pump or lack of oil—causes of a drop in lubricating oil pressure—as well as clogged radiators, broken fan belts and other causes for rise in engine temperature are easily detected before costly damage can result to the engine.

For more data, circle **No. E5** on Readers' Service Card, last page this issue.

Integrity

HAS BUILT OUR REPUTATION

FOR

BUILDING

BETTER

PIPE LINES

Houston
CONTRACTING COMPANY
— GENERAL CONTRACTORS
Laurence H. Favrot • R. P. Gregory • Geo. A. Peterkin

OIL • GAS
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WATER PIPE LINES

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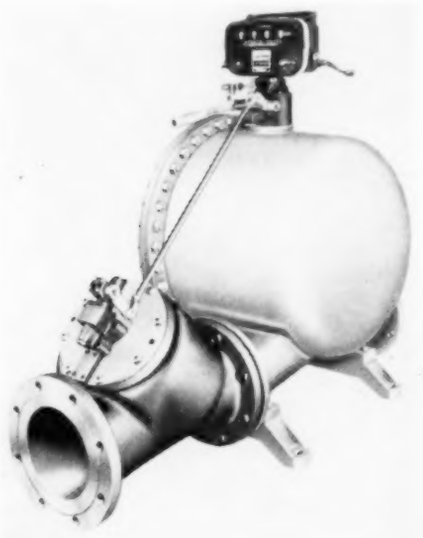

Quality Control Meters

With the addition of 6-inch and 8-inch sizes, Brodie Quantrols are available now for the full range of Brodie BiRotor meters from 2 inches to 8 inches with capacities from 100 to 1300 gallons per minute and working pressures up to 150 pounds per square inch. These automatic measured quantity control meters provide shock-free shutoff through regulated cushioned closing to prevent shock damage to pumps, piping and other line equipment. Brodie Quantrol Counters actuate the closing which decelerates the flow to smoothly shutoff at any desired preset gallonage.

The smaller sizes, up to 4 inches, are furnished in cast iron, but can be supplied in steel, while the larger sizes of 6 inches and 8 inches are furnished only in steel. In addition to being available as complete units for new Quantrol meter installations, Brodie furnishes a Quantrol valve kit for converting existing BiRotor meters to automatic quantity control.

For more data, circle **No. E6** on Readers' Service Card, last page this issue.

there's a better way to get it done!

Railhead or in plant facilities apply coating rapidly, uniformly

Somastic® Coated Pipe is your permanent protection against corrosion

Central or railhead plants are available to you for the application of Somastic® Pipe Coating. It is *thick*. It is *seamless*... no holidays because of overlapping layers, or bubbles. It is *re-inforced*, permanently. It is *rigid yet elastic*. And... it is proven under adverse soil conditions for more than 25 years. Why not coat your pipe *the better way?*

Write for full information TODAY!

Specializing in Pipe Protection Problems
• Tate and Centriline "In Place" Interior Cement Mortar Lining • "In Plant" and "Railhead" Centrifugal Spinning of Cement Mortar or Coal Tar Linings – Somastic® Exterior Coating • Pipe Wrapping • Reclamation: Removal of Old Wrapping, Straightening, Blasting, Beveling, Testing.

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WHY NOT LET BrakeSolve YOUR PARAFFIN Problem?

BRAKESOL is the safe, economical way to clean up and control paraffin in your production system. By using BRAKESOL, you get more production, by reason of having unrestricted flow and by avoiding those tank bottoms.

BRAKESOL is being used all over the world today and is accepted as one of the most effective methods of treating and controlling the paraffin problem.

BRAKESOL is safe to use and will not harm the skin, and the danger of fire hazard has been greatly minimized.

BRAKESOL is non-corrosive and will not harm production or refinery equipment.

HOLDS PARAFFIN IN SUSPENSION from FORMATION to REFINERY

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Carmi, Illinois	7191
Casper, Wyoming	2-3453
Dallas, Texas	DAvis 4-4884
Ft. Morgan, Colo.	UNderhill 7-6389
Houston, Texas	HOmestead 5-6648
Lovington, New Mexico	6-5954
New Iberia, Louisiana	EMerson 9-3498
Odessa, Texas	FEderal 7-3630
Pampa, Texas	MOhawk 9-9994
Edmonton, Alberta, Canada	8-4815
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There's a BRAKESOL Treating Engineer near you who can show you the most effective methods of application to solve your paraffin problem... in one easy operation. Contact him TODAY, he'll be glad to help you. For additional information, write us direct, or contact your local supply store.

BrakeSol INC.

P.O. Box 9506 Oklahoma City, Okla.

Export Distributor: The National Supply Co., Export Division

Pre-planned to fit your needs...

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WHITLOCK Standardized Hi-Transfer EXCHANGERS

WHEREVER your cooling problem calls for a small to medium size exchanger, it will pay you to consider the advantages of using low cost, standardized Whitlock Hi-Transfer Exchangers. Pre-designed and immediately available from stock in a wide range of sizes, these dependable, easy-to-install units can save you hours of time and trouble . . . help keep your original equipment unit costs at a minimum. Check these built-in features for yourself . . .

- **Low cost. Quantity produced according to standard details from stock materials.**
- **High heat transfer with minimum pressure drop.**
- **Performance-proved safety and anti-fouling features.**
- **Rugged, non-corrosive copper and copper alloy construction for long, trouble-free service.**
- **Simplified installation and servicing. All units and parts completely interchangeable; removable bonnets and straight tubes for easy cleaning and inspection.**

THE WHITLOCK MANUFACTURING CO.
98 South St., West Hartford 10, Conn.

Designers and builders of bends, coils, condensers, coolers, heat exchangers, heaters, piping, pressure vessels, receivers, reboilers

Get the full facts NOW!
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SAFETY CONTROLS

FOR PUMP AND COMPRESSOR STATIONS

Here are a few of the many functions Mercoid Controls perform in safeguarding major pipeline equipment:

- *High discharge pressure*
- *High case pressure*
- *Low suction pressure*
- *High case temperature*
- *High bearing temperature*
- *Lube oil pressure*
- *Instrument air pressure*
- *Mechanical seal failure*
- *Differential pressure for pressurized control rooms*

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INDOOR
General Purpose
(NEMA 1)

OUTDOOR
Weather-Resistant
(NEMA 1A, 2, 3, 4)

HAZARDOUS LOCATIONS
Explosion Proof
NEMA 7, 9, 9A)

Mercoid Controls are also available in steel cabinets made to your specifications

Write for Catalog No. 857

THE MERCOID CORPORATION
4201 Belmont Ave., Chicago 41, Ill.

The main console visually displays all ordered and unordered changes in the status of remote devices.

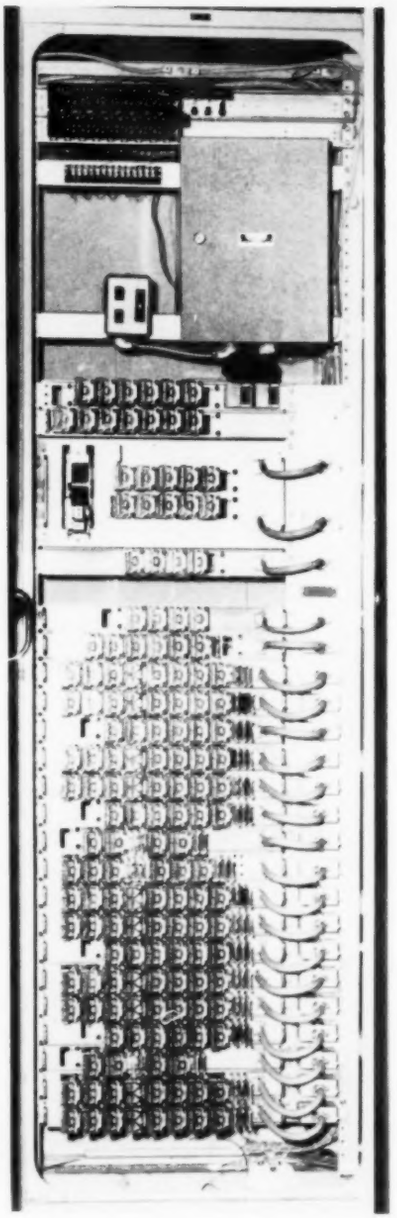
Selective Control System

The new pushbutton selective control system for pipe line operations has been introduced by the Bell System. Pushbuttons provide a simple means of sending self-checking "fail-safe" codes to a distant station to select and operate remote equipment.

A glance at the main console will tell if a remotely controlled device is on or off, open or closed—whether bearing temperatures are within the prescribed limits—or other status information. The remote station automatically sends a reply signal to the main station to indicate visually the status of the remote unit.

With the SC2, doubts about conditions at outlying stations can be answered. Press the inquiry button associated with the function and a signal is sent to the remote device to get an up-to-the-minute verification of its status.

Automatic verification is provided by the SC2. A check on line facilities and the status of remote units may be initiated automatically at periodic intervals. This "watch dog" feature will also automatically notify the main control station operator when a remote unit has changed status without an order. SC2 not only tells of the change but also the location of the unordered action.



Building block station equipment has plug-in relay panels for ease of maintenance and expansion.

For more data, circle **No. E7** on Readers' Service Card, last page this issue.

NOTICE: Specify **PELCO** Welding Saddles

No change except the corporate name. We still have the same ownership, same management, same address, same telephone, and use the same 45 years of experience to render the same service under the same trade name—"PELCO."

PELICAN SUPPLY CO. INC.

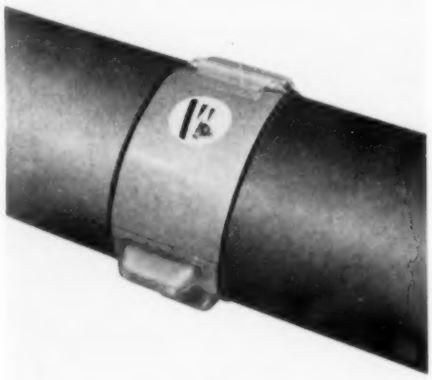
P. O. Drawer 1108 Shreveport (84), La.
SEE YOUR NEAREST SUPPLY HOUSE

Electrode

A new electrode for holiday detectors made of conductive silicon, which will not "wet" in hot coating material, and which holds its shape and conductivity in temperatures from —20° F. to +450 °F., has been developed by Tinker & Rasor. Used for inspecting flat coated surfaces by high voltage electrical energy, this conductive silicon electrode replaces the wire brush electrodes used for the past 25 years.

Pipe coating materials such as hot bitumens, which clog wire brushes, will not adhere to this silicon. It will function equally well on dry or moisture damp surfaces. Its natural resistance to abrasion gives this electrode longer life than wire brush electrodes which tend to frazzle and become tangled and matted.

For more data, circle **No. E8** on Readers' Service Card, last page this issue.



Insulator

The new WmSON "Steel Clad" insulator for big-inch pipe lines in oversize casings under highways and railroads is now available from T. D. Williamson, Inc. for all pipe lines 16-inch and larger. Design features of this heavy duty insulator include hollow forged steel runners machine welded to a one-piece flexible steel band.

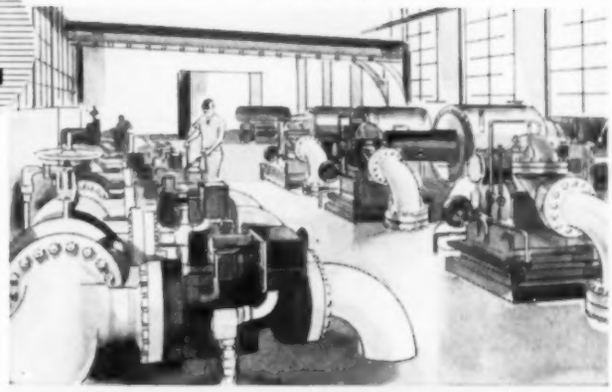
The "Sling joint" prevents the butt edges of the band from digging into the pipe coating and a thick insulating liner of oil-resistant rubber secured to the high-tensile steel band provides positive insulation.

For more data, circle **No. E9** on Readers' Service Card, last page this issue.

A Solution to Pipeliner Problems

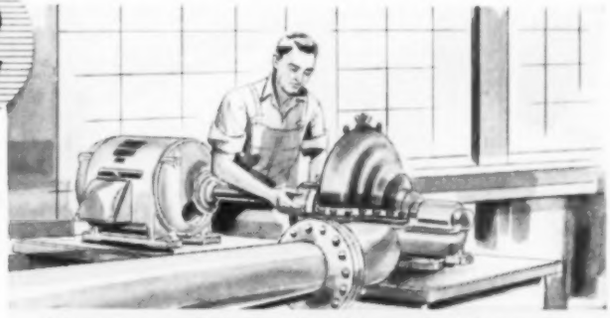
John Crane®
8-B
SHAFT SEAL

1 ON HIGH PRESSURES



Specially engineered hydraulically balanced construction permits handling of all pressures encountered in modern pipe lines. Pipeliners report that 8-B Seals in continuous main line pump service for more than 44,000 hours are still in perfect working condition

2 ON MAINTENANCE MAN-HOURS



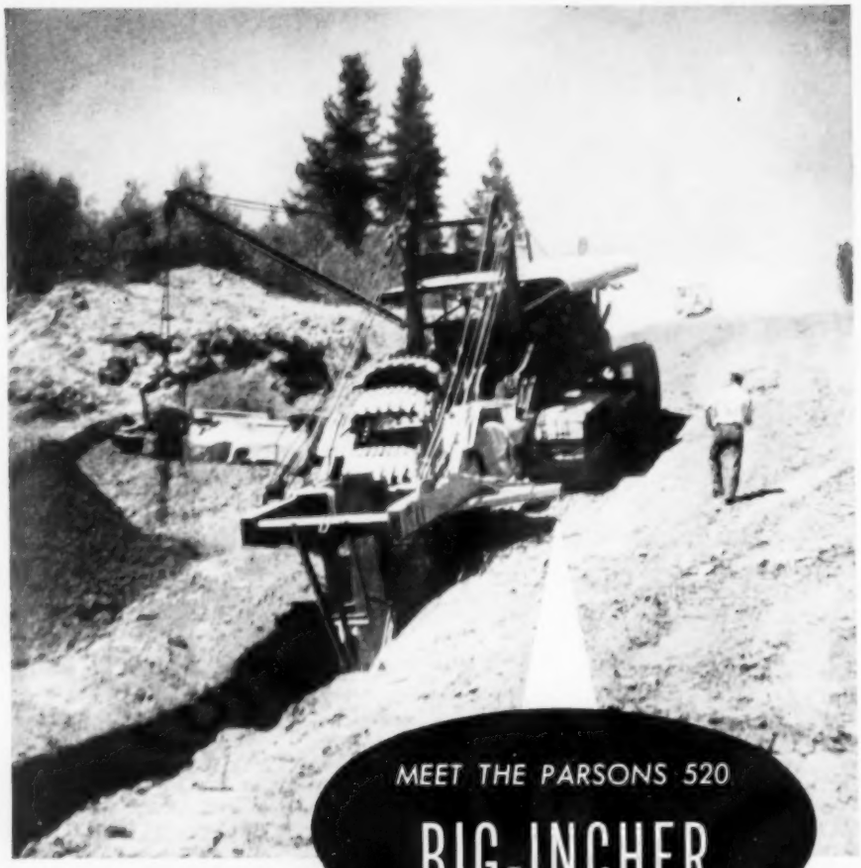
8-B Seals are quickly installed. Removal of the top casing on split case pumps is not necessary. Simply slide the entire unit along the shaft into position. Once installed, little or no attention is required. Service-life is long. No messy leakage.

The 8-B Seal is available in a full range of shaft sizes for every main line or tank farm pump service.

For general information request Bulletin S-215-1. Give mechanical specifications and service details for specific recommendations.

Crane Packing Co., 6434 Oakton Street, Morton Grove, Illinois, (Chicago Suburb) *In Canada Crane Packing Co., Ltd., Hamilton, Ont.*

CRANE PACKING COMPANY



MEET THE PARSONS 520

BIG-INCHER

Here's a smaller wheel-type Trenchliner for laterals, gathering-lines, etc. This Parsons 150 digs 16 to 30 inches wide, 5¾ feet deep, at speeds up to 25 feet per minute. Parsons line also brings you ladder-type Trenchliners, on rubber tires or crawlers — in a complete selection of sizes to fit any trenching job.

Big things have happened since you last bought a big cross-country ditcher! Look at the new sizes recently added to the line of *Trenchliners for pipeliners.* Parsons now brings you a Big-Inch wheel-type 520, with digging speeds up to 28 feet per minute — widths from 40 to 52 inches, depths to 8½ feet. And that's not all —

Also, a MIDDLE-INCHER

Another big-wheel Trenchliner has joined the Parsons line — a Middle-Inch 420, which opens up to 44 lineal feet of trench per minute. It digs 31 to 46 inches wide, at depths to 7½ feet.

Both of these big, heavy-duty machines have been thoroughly *job-proved.* They were formerly built by C-R-C, and now manufactured by Parsons — bringing you the combined engineering experience and services of both firms. Want all the facts? Send for literature today.

PARSONS COMPANY, DIVISION OF KOEHRING
NEWTON, IOWA

. . . . . .

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Send us specs. on: ☐ 520 ☐ 420 ☐ 150

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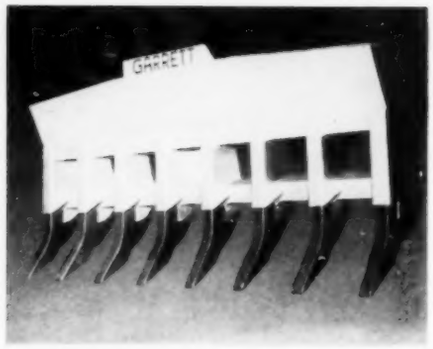
TRENCHLINERS® for PIPELINERS



Land Clearing Blade

The skeleton-like design of the Garrett land clearing blade for Caterpillar D-8 tractors aims at strength without excess weight and prevention of clogging. The teeth extend 6 inches beyond the moldboard and form a rolling curve so that large chunks are kept in motion and loose material can fall clear. The use of forged steel for the teeth saves weight, permits a more compact blade design and reduces breakage to a minimum.

The high moldboard is faced with Cor-Ten high tensile strength steel to resist wear and accidental damage. Because it is slightly higher in the middle than at the ends, material falling on it tends to travel to the ends and is easily sheared off.

Skeletonizing the blade helps to prevent clogging and gives the operator improved visibility, particularly at the ends. For a short distance in the center, the blade is built solid to protect the radiator and lift mechanism.

For more data, circle **No. E10** on Readers' Service Card, last page this issue.

Truck Crane

The Truck-Crane unit, requiring only 18 inches of space behind the truck or tractor cab, leaves the entire body free for useful payload area. Power for the Truck-Crane is completely hydraulic in all phases of operation with a PTO driven pump. Boom swing is 280°. It projects or retracts hydraulically in horizontal position or at any point up to an 85° elevation.

Both horizontal and elevating-type booms are available and offer speed, versatility and increased capacity to loading and unloading operations. Capacity is 5000 pounds. Control levers are on both sides of the truck for operation from ground level.

These units are manufactured by Truck Crane, Inc., subsidiary of Anthony Company.

For more data, circle **No. E11** on Readers' Service Card, last page this issue.

New Equipment Literature

For more data on New Equipment or copies of Catalogs and Literature reviewed in this issue, use the Reader Service postcards just inside the back cover and facing the Advertisers Index. Simply circle code numbers of items desired—sign and mail card.

Backhoe and Loader

The Ottawa Industrial backhoe and front end loader have been approved by the Minneapolis-Moline Company for mounting on their new model 445 industrial tractor. The Ottawa backhoe also has been approved for the 445 utility tractor. Ottawa's patented One-Trol (single operating lever) controls all the actions of the front end loader and dual One-Trols on the backhoe permit the operator to coordinate all movements of the bucket, stick and boom for fast operation without fumbling for multiple levers.

The backhoe, available in two models, can be equipped with buckets from 12 to 36 inches in width. These and other features are described in bulletins from Ottawa Steel Division, L. A. Young Spring & Wire Corp.

To get a copy, circle **No. E12** on Readers' Service Card, last page this issue.

Tube Fittings

W. D. Wynant, Tube & Hose Fittings Division, Parker Appliance Company, has issued a 52 page catalog presenting the full line of Triple-lok Tube fittings, made in brass, steel, stainless steel, and aluminum; all shapes including new swivel nut type and straight threaded fittings with o-rings for new S.A.E. straight thread boss.

To get a copy, circle **No. E13** on Readers' Service Card, last page this issue.

Silencer Catalog

The complete line of Kittell industrial, mobile and marine silencers including many new models is described in the new 1957 catalog available from Kittell Muffler and Engineering Company. Dimensions, design principles, application photographs and other data needed to specify Kittell silencers are given.

To get a copy, circle **No. E14** on Readers' Service Card, last page this issue.

Kralastic

The extrusion of Kralastic, a blend of plastic and rubber, is explained in a new booklet published by the Naugatuck Chemical Division, United States Rubber Co. The booklet describes equipment needed, the production process and average production rates for various dimensions of pipe.

To get a copy, circle **No. E15** on Readers' Service Card, last page this issue.

Fieldjointer

American Coating Supply Company has issued a new brochure on the Fieldjointer method of coating welded steel pipe joints. Advantages of the Fieldjointer over the old "granny-rag" method are described and results of field tests are given. The brochure also outlines specifications and gives pictorial examples of the Fieldjointer in use.

To get a copy, circle **No. E16** on Readers' Service Card, last page this issue.

Company Brochure

A new 28-page brochure covering conditions for processing and prices of all services of the company—including coating and wrapping, hydrostatic testing, threading and coupling, beveling, welding, API drifting, straightening and storage of pipe—is available from Syd E. Culbertson Co., Inc.

To get a copy, circle **No. E17** on Readers' Service Card, last page this issue.

Rope Slings

John A. Roebling's Sons Corporation has issued a new book on wire rope slings and assemblies. The catalog contains information on all-purpose slings with tapered sleeve attachments, Roegal cable-laid slings, flatweave slings, railroad slings and special assemblies and fittings.

To get a copy, circle **No. E18** on Readers' Service Card, last page this issue.

Electromagnetic Control Catalogs

The Automatic Switch Company has issued seven new electromagnetic control catalogs. These include catalogs on automatic transfer switches, remote control switches, magnetically held contactors, ASCO relays, A-C and D-C solenoids, electric plant controls and a complete electromagnetic control catalog.

To get a copy, circle **No. E19** on Readers' Service Card, last page this issue.

Circle numbers on Readers' Service Cards on last page

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send for the world's most complete, illustrated catalog of

ELECTRIC LANTERNS and SAFETY CANS

VALUABLE DATA:

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- High power searchlights
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- Oily Waste Cans

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CATALOG NUMBER 569-P 5

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QUICKLY—PERMANENTLY

SKINNER-SEAL PIPE JOINT CLAMPS stop leaks at joints. Put on under pressure—without interruption of service. Quick, simple, lasting repair. Sizes 1/2" to 24" incl. in stock.

SKINNER-SEAL COLLAR LEAK CLAMP—designed to stop every type of collar leak in oil and gas lines. Sizes: 2" to 13" inclusive.

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Radiator
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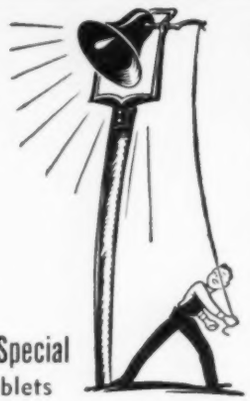
Systems
Efficiency
with
Sand-Banum Special
In Handy Tablets



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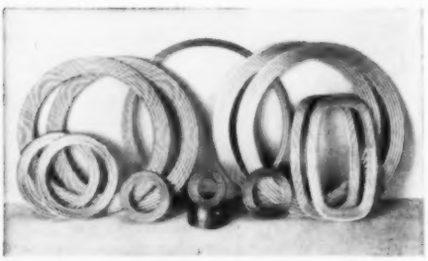

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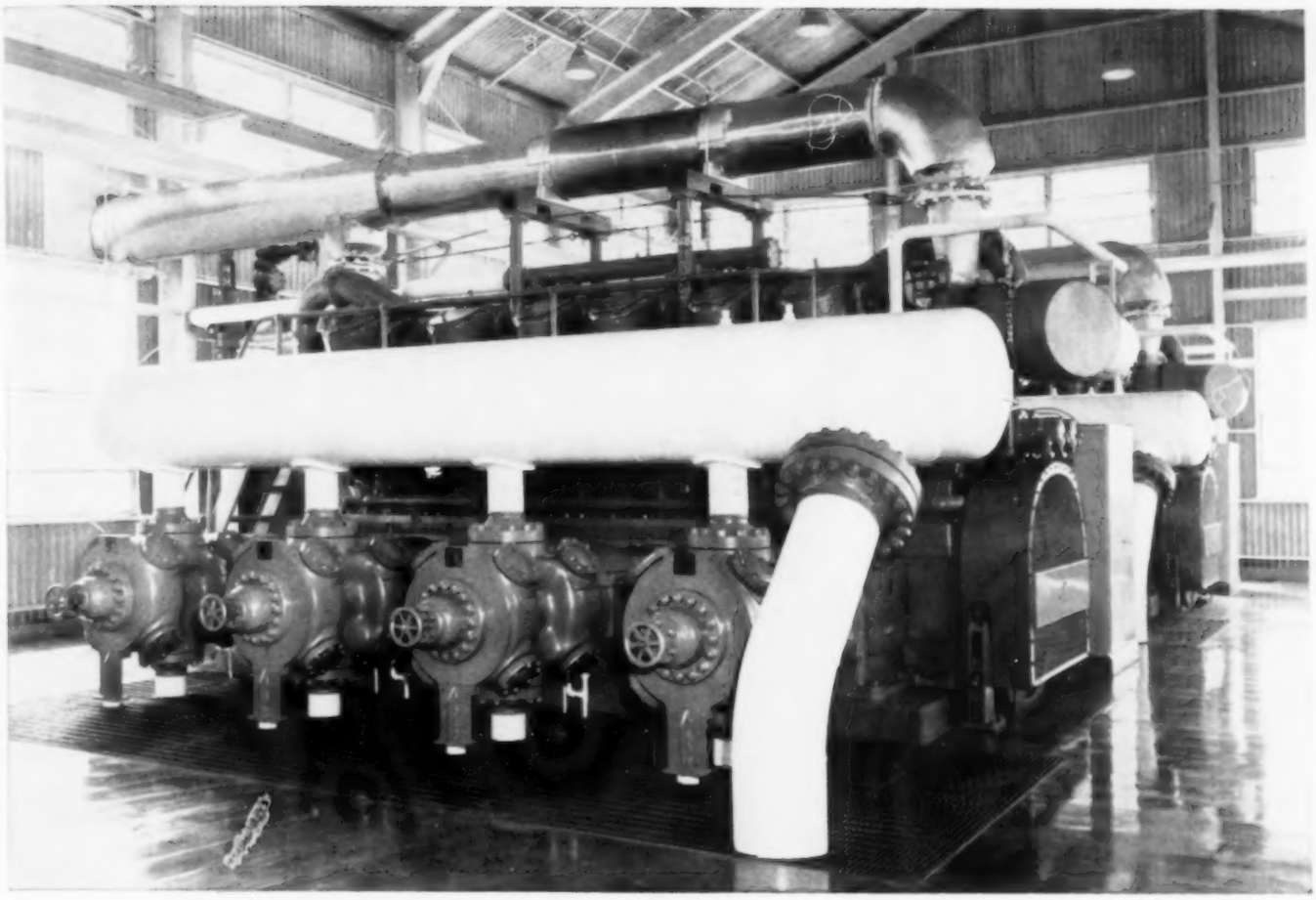

At Shelbyville, Indiana

American Louisiana installs 10,000 hp of KVS turbocharged gas-engine compressors

At Shelbyville, Indiana, in one of the three primary stations of American Louisiana Pipe Line Company, the efficiency of Ingersoll-Rand compressors and the flexibility of 4-cycle power are being applied to the task of supplying gas to utilities in Michigan, Wisconsin, Iowa and Missouri.

All of the five gas compressors at the Shelbyville station are 2000-hp Ingersoll-Rand KVS turbocharged gas-engine units. These are basically the same machines which have been setting new records since the first KVS was installed early in 1952, but incorporating the improvements which have resulted from years of tough service.

Incidentally, the first KVS (and the world's first turbocharged engine-compressor) was installed for an American Louisiana affiliate. With the forthcoming installation of six units at its new Defiance (Ohio) station, American Louisiana and affiliates will be operating 23 KVS compressors totalling 44,000 hp.

In addition to heavy-duty compressors, Ingersoll-Rand equipment for pipeline services includes rugged 4-cycle V-angle engine-generating units, centrifugal pumps, starting-air compressors, air and electric Impactools, and many other products. Ask your I-R representative how I-R can help you on your job.

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